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OCTOBER 1937

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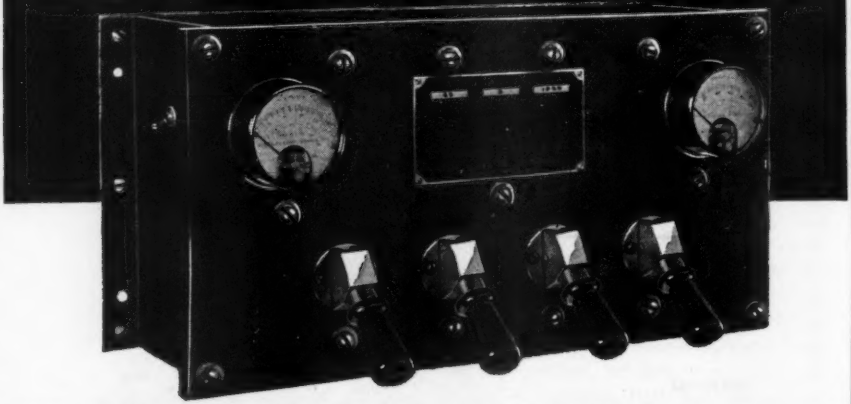

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The Monthly Review

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Editorial

A long hot summer has gone on its way, during which most of us have been busy trying to keep cool, bodily and temperamentally. The vacation period is well nigh over and those of us who have been fortunate enough to have had one, feel much the better for it. The cool snappy days of the fall are here and with them there comes, or should come, renewed vigor and desire to participate in the things that interest us most. These are many and varied. We, who have the distinction of being the members of the A.E.S., should have the interest and ambition to do something that will add to our standing and prestige in the Metal Finishing World. What more effective way of doing this have we than taking into our ranks all the eligibles in the plating and allied industries.

As a vice-president of the Society the writer has been requested by Mr. A. B. Wilson of Detroit, national president of the A.E.S., to continue the campaign to increase the membership of the Society. I will try earnestly to do this. However, anything I might do would fall far short of accomplishing the desired end if the full and hearty support of the Branches and the members thereof is not forth-coming. Realizing this, I am taking the opportunity at this time afforded me through the pages of our Monthly Review to ask the continued and renewed support of the Branches and individual members to the end that when the Society convenes again in Milwaukee in June 1938, a very satisfactory report can be made and a substantial increase in our Rolls will be shown. We have a large potential field from which members can be drawn. We do not have to go far afield to get them. It is not necessary or do I think advisable at this time to take in any one interested in metal finishing. It is the

writer's opinion after much thought and calculation that only one in every four who are actively and definitely engaged in plating and finishing operations and who have the necessary qualifications and background for eligibility, as now required, are members of the Society. An earnest and continued effort to interest these prospects would, conservatively speaking, result in the enrolling of 33% of them. This would mean doubling the number of our present membership. That would be an enviable position for the Society to be in. In this connection no definite plan of procedure to attain this end will be suggested, inasmuch as, at this time, it is my belief that each Branch and the members in charge of the work therein know better than one not familiar with sectional conditions just how to institute a vigorous campaign to accomplish their purpose. I have or will contact all those engaged in this effort in the various Branches during the current month and I trust that I will have the support and co-operation of all those so engaged. In return I will do all that I can to assist and advise in this important part of the Society's program for 1937-38 to the end that the goal of our membership campaign may be arrived at.

FRANKLYN J. MACSTOKER,
Vice-President, A. E. S.

THE TWENTY-SIXTH ANNUAL CONVENTION OF THE A. E. S.

The twenty-sixth annual convention of the A. E. S. will be held next year in Milwaukee on June 13th, 14th, 15th, and 16th. Plans are well under way with the election of the general chairman and appointment of various committees.

Milwaukee enjoys an enviable reputation for being a most attractive convention city. It is nestled in a broad expanse of bay, a part of beautiful Lake Michigan. Milwaukee's harbor has often been called "the Naples of America". It is an impressive view and one that visitors never fail to gaze at in awe and admiration. It can best be seen from the Lincoln Memorial bridge and drive which extends along the lakeshore for miles through parks and ravines.

Milwaukee is essentially an American city. It is a city of homes. In all parts of the city there are beautiful residential districts. Milwaukee is proud of having been designated the healthiest and safest city in the United States. It is the twelfth largest city in population and ninth in the value of manufactured products.

With the repeal of prohibition, Milwaukee again takes its place as a leading producer of malt and malt products. Included in the plans of the convention committee is a tour through one of the large breweries. Such a trip is always exceedingly interesting and educational.

The committee is planning on having a great convention and renewing some of the old activities that were so popular in years gone by. There will be shop visitation. We boast of having in Milwaukee some of the finest job plating shops in the country. A visit to some of these plants will be a treat to all platers. A trip to beautiful Waukesha Beach is planned by way of an outing, where there will be a ball game between the East and West, followed by dinner and dancing.

In subsequent issues we will tell you more about the convention city and our plans for making the twenty-sixth a convention that will be long remembered.

We are planning to reduce the registration fee without reducing any of the activities of the convention. Let nothing keep you from coming to Milwaukee and enjoying real hospitality.

R. M. GOODSELL,
General Chairman.

MEMBERS OF THE A.E.S. GIVE A BIRTHDAY PARTY IN HONOR OF R. S. LEATHER

A most enjoyable event, given by the Eastern states representatives of the A.E.S. was held at Leacrest, the home of Mr. R. S. Leather, President of the Lea Manufacturing Company on Saturday, Sept. 18, 1937. The occasion was in honor of Mr. Leather's birthday, and needless to say, it was a grand success. A large birthday cake was brought in when the afternoon sports were ended. After everyone had filled up on the good things provided, a beautiful Elks finger ring was presented to Bob by Jack Barry on behalf of all the platers present, as a token of the high esteem in which he is held by the members of the A.E.S. Mr. Leather, surprised and delighted with the gift, made a few appropriate remarks.

Leacrest, the home of Mr. and Mrs. Leather, is a beautiful spot in the town of Bethlehem, about sixteen miles from Waterbury. On the estate is a fine apple orchard, an old schoolhouse that served that section of the town until about a dozen years ago when a modern structure was erected for the education of the children in a more central location. Two fine natural springs, gardens, shade trees, etc.

Leacrest house is beautifully situated on a hill from which can be seen the surrounding country with the splendor of fall foliage that makes these New England towns a sight worth seeing at this time of the year.

Ninety-two persons attended the outing, including Arthur Mintie, President of Boston Branch; Edward Delorme; Secretary Andrew Garrett, and other members from the Hub. Oliver Sizelove and son, Bob Mooney, John Oberander, George Hogaboom, Bill Gray and a large delegation from Waterbury Branch; other branches represented in addition to those mentioned were New Haven, Bridgeport, Hartford, Springfield and Newark.

Horseshoe pitching, trap shooting, and archery were popular between meals. Three silver cups were presented for these events. The Archery Contest was won by Clifford Charles; Frank Kiessling won the first prize for trap shooting, and the one and only Joe Downes was declared the best horseshoe pitcher. Joe didn't compete with the Massachusetts Champions who came down from Boston and gave a wonderful exhibition of what experts can do when they really want to play barnyard golf.

Everyone present had such a good time that it was late in the evening before the last hilarious echoes of the departing guests were lost in the gloomy darkness of the surrounding hills as they bade farewell to the master of Leacrest Manor, wishing both Mr. and Mrs. Leather good health and happiness for many years to come.

MICHIGAN COLLEGE OF TECHNOLOGY LAUDS A. E. S. MEMBER

William Gertz, instructor in the protective coatings division of the metallurgy department at the Michigan College of Mining and Technology, Houghton, was named assistant professor, effective October 1. Professor Gertz, an alumnus of Michigan Tech, joined the instructorial staff in 1931. He introduced the protective coatings work two years later, and has built up his division until it is one of the most comprehensive of its kind in the United States. He is a member of the American Electro-Platers' Society.

The pH *of* Alkaline Plating Solutions

By GEORGE B. HOGABOOM
Hanson-Van Winkle-Munning Company
Read at New York Convention, 1937

To operate a nickel solution without knowing the pH value is to invite trouble. If a solution does not plate well the first thing that is investigated is the pH. There is a definite understanding of the results obtained in a nickel solution when the pH value is from 6.6 down to 1.5. The pH range of alkaline plating solutions run above pH 7 has received very little attention, yet it is reasonable to assume that if it is important to operate an acid solution within some prescribed pH range, that it is of equal importance to control the pH of any solution operated above pH 7. Several years ago, in 1929, Dr. R. Semon (B. F. Goodrich Co., Akron, Ohio), with whom we were working on brass plating steel for adhesion of rubber, found that to obtain consistent results it was necessary to control the pH of the brass solutions.

At the A.E.S. Cleveland Convention, in June, 1936, Dr. H. P. Coats (Firestone Steel Products Co.) presented a paper on "Brass Plating for Rubber Adhesion", and recommended that a solution for such work be operated at pH 10.7. He made many experiments with brass solutions of different composition, but always controlled the pH, keeping it between 10.1 and 12.1. The deposits from these solutions were kept as near 70% copper and 30% zinc as possible, as that ratio is required to obtain good adhesion of rubber when vulcanized. As both of these men were interested in the physical properties of the brass deposit, they made no mention of any change in the color of the deposits obtained.

In October, 1936, Dr. Richard Springer (Langbein-Pfanhauser-Wercke Co., Leipzig, Germany) published the first paper directly dealing with the pH of alkaline plating solutions. He stated very truly, "Up to today it has hardly been regarded necessary to study alkaline baths with the same viewpoint as nickel plating baths. In the literature there is a decided want of articles on the connection between the method of operation and the pH

value of alkaline baths ..... Scattered experiments with brass baths in practice have shown that the performance of these baths is considerably changed, as a pH value of 10.3 or 10.4 is exceeded."

Dr. Springer made several tests with brass, bronze, cadmium, cyanide copper, and silver baths. An extended abstract of this paper by Dr. Springer was published in the Metal Industry (New York) in April, 1937.

We are indebted to Dr. Springer for the data assembled, as it was very helpful in the investigations that had been started on the same subject and that had for its object the effect of the pH value of alkaline plating solutions on the anode and cathode efficiency. While the color of a deposit from a brass solution is important, the real value of any other plating solution lies in its anode and cathode efficiency. The exception being the chromium solutions in which insoluble anodes are used and the character of the deposited metal is the main objective, regardless of the low cathode efficiency which, however, is a subject that has and is receiving much attention.

The solutions used in this investigation were brass, cyanide copper, cyanide copper + rochelle salts, cyanide zinc, cadmium and silver. The formulas were those that are in "Principles of Electroplating and Electroforming", Blum & Hogaboom, 1930 edition. The solutions were made in one liter glass jars and run in series with a copper coulometer. The anode efficiencies are probably high, as they had a film on them, some very light, others quite heavy, as they came from the solution, and these were washed off before weighing. These films on anodes would make an interesting study, as it is probable that the metal does not go into solution directly, but that there is what may be called a primary and secondary reaction at the anode. What the composition of the film created by the primary reaction is, has never been determined.

To ascertain the most suitable alkali for increasing the pH, ammonium hydroxide, sodium carbonate and sodium hydroxide were tried. It was found that sodium hydroxide was the only chemical whose solution had a pH value sufficiently high so that the dilution of the solution under test was not appreciable. The addition of as much as 43% by volume of concentrated aqua ammonia c. p. did not increase the pH value of a brass

solution beyond 12.0; a 15% solution of sodium carbonate has a pH value of 12.2, while a 5% solution of sodium hydroxide has a pH of above 13.6. While it is realized that the use of sulphuric acid cannot be recommended for shop practice, it can be used in experimental work where there is a suitable hood to take off the fumes. In this work sodium hydroxide and sulphuric acid were used so that the composition of the solution would not be materially changed.

All solutions were made with commercial sodium cyanide except the silver solution in which potassium cyanide was used, and therefore potassium hydroxide to change the pH value. Steel cathodes were used except in the silver solution, in which brass cathodes were run after "Striking" them to prevent peeling of the deposit.

All pH measurements were made colorimetrically. The following indicators were used:

Thymol Blue	pH	8.0 — 9.6
LaMotte Purple	pH	9.6 — 11.2
Sulfo-Orange	pH	11.0 — 12.6
LaMotte Violet	pH	12.0 — 13.6

These were tested in a regular block comparator. In Dr. Springer's work the pH paper was used. While the pH values obtained with pH paper were comparable to those obtained with the comparator, the color of the papers faded very rapidly, which made it difficult to check results. The papers began to lose color in above two minutes, while the solution in the ampoules did not change in two hours.

CYANIDE COPPER SOLUTIONS

The cathode showed an evidence of streaking as the pH was increased. The efficiency at all pH values was above 80% in the solution used. The anode efficiency was over 100% from pH 8.0 to 12.6. At 13.0 it started to drop and at 13.4 the anodes coated over with a green film that increased as the solution was run. The efficiency at the end of the run was 5.9%. This green film on copper anodes in a cyanide solution has generally been attributed to the low free cyanide content. (Fig. 1 — see page 724) (Table I)

TABLE I — CYANIDE COPPER

FORMULA:	Copper Cyanide	— 3 oz/gal
	Sodium Cyanide	— 4.5 "
	Soda Ash	— 2 "
	Hypo	— 1/64 "
TEMP.	:	104°F.
C. D.	:	15 amp/ft²
TIME	:	1 Hour

pH	*Anode Efficiency — %*	*Cathode Efficiency — %*
8.0	102.6	81.8
8.4	102.0	83.3
8.8	102.3	82.3
9.2	101.3	81.0
9.6	101.0	84.4
10.2	100.5	84.8
10.6	102.9	85.7
11.0	102.4	86.4
11.4	102.4	88.2
11.8	101.0	88.9
12.2	101.1	88.9
12.6	101.0	87.4
13.0	99.2	89.3
13.4	5.9	86.3

Dr. Springer found that blisters formed on the cathode in his solution when the pH value was between 9.7 and 10.4. In this work no blistering occurred. This may be due to the difference in the composition of the solutions. This is not possible to determine, as the potassium cyanide content in any of the baths he used is not designated as "combined" or "free"; or, as Coats would rather say, "uncombined" cyanide.

Apparently the best pH range is between 11.0 and 12.2.

CYANIDE COPPER-ROCHELLE SALT SOLUTION

This solution is becoming generally used, as it can be operated at a higher current density than a cyanide copper solution. It is strange that this solution has not been investigated and adopted a long time ago. It is called the "Weil" solution by Langbein in his "Electrodeposition of Metals", 1905 edition; Barclay and Hainsworth referred to it in 1912; Dr. O. P. Watts, in his paper on "Cleaning and Plating in the Same Solution" (Transactions Electro-chemical Society, Vol. 27, p. 141, 1915), mentions Weil's solution and found that rochelle salts "cleaned the copper anode."

The cathode efficiency of this solution averaged over 90% in all the runs made. The deposit was clear and free from streaks,

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TABLE II — ROCHELLE SALT COPPER

FORMULA: Copper Cyanide — 6 oz/gal
Sodium Cyanide — 7.1 "
Rochelle Salts — 6.0 "
Free Cyanide — 0.5 "
TEMP. : 130°F.
C. D. : 30 amp/ft²
TIME : 1/2 Hour

pH	*Anode Efficiency — %*	*Cathode Efficiency — %*
8.2	101.7	88.1
8.6	101.5	88.4
9.0	101.3	89.2
9.4	100.6	92.0
9.8	100.5	90.6
10.2	100.6	91.3
10.6	101.2	92.2
11.0	98.9	92.5
11.4	101.4	92.7
11.8	102.3	94.3
12.2	100.8	94.0
12.6	102.3	94.0
13.0	101.2	94.7
13.4	100.0	93.0

although a lighter color was had at a pH value between 9.8 and 10.6 than at a higher pH. At 13.0 the deposit was a dull red. At the lower pH values, i.e., 8.2 to 9.4, the anode started to coat over and cause polarization. (Fig. 2 — see page 726) (Table II)

CYANIDE ZINC SOLUTION

The pH range for successful operation of a cyanide zinc solution is very narrow. While the cathode efficiency is above 98%, the anode efficiency changes rapidly. At pH 13.4 the efficiency is above 100%, yet with a change of only 0.4 pH — 13.0 — the anodes take on a very dark color and the efficiency falls to 42.5%. When the pH is reduced to 12.6 the anodes coat over with a heavy film that increases as the pH is lowered to 12.2 when the efficiency is —13.2%. This figure is due to the heavy adherent coating which increased the weight of the anode. This was true when special alloy anodes, e.g., the zinc-aluminum-mercury alloy, as well as when the high purity zinc was used. With the latter the formation of a sludge was very rapid. These results from the study of the pH values of cyanide zinc solutions were quite upsetting, and duplicate runs had to be made before the data obtained were accepted. The results

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TABLE III — CYANIDE ZINC

FORMULA: Zinc Cyanide — 8 oz/gal
Sodium Cyanide — 3 "
Sodium Hydroxide— 7 "
TEMP. : 70°F.
C. D. : 2.5-15 amp/ft²
TIME : 1/2 Hour

pH	*Anode Efficiency — %*	*Cathode Efficiency — %*
13.4	104.0	98.2
13.0	42.5	98.2
12.6	3.6	98.2
12.2	-13.2	98.9

TABLE IV — SILVER

FORMULA: Silver Cyanide — 3.5 oz/gal
Potassium Cyanide — 7.0 "
Potassium Carbonate — 5.0 "
Brightener — CS_2 — Q.S.
TEMP. : 73°F.
C. D. : 5 amp/ft²
TIME : 1/2 Hour

pH	*Anode Efficiency — %*	*Cathode Efficiency — %*
8.2	70.7	99.8
8.6	101.4	100.0
9.0	102.0	100.0
9.4	105.0	99.7
9.8	101.3	99.9
10.2	101.5	100.0
10.6	100.0	99.3
11.0	101.1	99.5
11.4	101.2	99.3
11.8	102.2	100.7
12.2	102.2	100.8
12.6	102.5	100.8
13.0	100.8	100.2
13.4	94.0	100.1

TABLE V — CADMIUM

FORMULA: Cadmium Oxide — 3 oz/gal
Sodium Cyanide — 13.5 "
Free Cyanide — 9 "
TEMP. : 70°F.
C. D. : 10 amp/ft²
TIME : 1/2 Hour

pH	*Anode Efficiency — %*	*Cathode Efficiency — %*
8.2	102.7	97.6
8.6	103.0	96.6
9.0	103.8	97.3
9.4	102.8	98.5
9.8	103.2	98.0
10.2	104.3	98.7
10.6	101.4	99.0
11.0	103.3	100.0
11.4	104.1	99.5
11.8	103.0	100.3
12.2	102.8	100.3
12.6	103.8	100.4
13.0	102.4	100.0
13.4	102.2	99.8

of this one solution prove the value of pH control of alkaline plating solutions. (Fig. 3 — see page 727) (Table III)

SILVER SOLUTIONS

The permissible pH range of a cyanide silver solution is very wide. The anode and cathode efficiency averages 100% except when the very low pH 8.2 is used. The best results from the physical properties of the cathode were obtained between pH 10.2 and 11.4. At 12.2 the cathodes began to get rough and at 13.0 very dark, even in the presence of the carbon disulphide brightener. At pH 8.2 the anode efficiency was only 70% and a vigorous oxygen evolution was noticeable. A bluish colloidal precipitate formed in the solution, probably due to the attack on the iron anode hook. At pH 10.6 the anode had a highly reflective surface not unlike that had when the free cyanide is high. At pH 11.8 the anode had a spotted appearance. (Fig. 4 — see page 727) (Table IV)

CADMIUM SOLUTIONS

When the pH range of a cadmium solution was between 8.2 and 9.0 the solution was cloudy and the cathode pitted. The best range was between 9.4 and 10.2. From 11.0 to 13.6 the anodes coated over and the cathodes took on a dark color, which became very pronounced at pH 13.4. Regardless of the pH range, the anode and cathode efficiencies were high. Springer found that the deposit was not adherent unless the pH value of the solution was between 12.0 and 13.0. With the solution used in this work no difficulty was experienced with the adhesion of the deposits. The character of the deposits was effected materially when the pH was between 12.0 and 13.0 especially the brightness which has always been a requisite for an acceptable coating of cadmium. (Fig. 5 — see page 728) (Table V)

BRASS SOLUTIONS

This proved to be the most interesting solution studied. The results that were obtained were unexpected. None of the other solutions run were as susceptible to changes in the pH value. Springer noticed a change in the color of the brass

TABLE VI — BRASS (Cold)

FORMULA:

Copper Cyanide	— 3.6 oz/gal
Zinc Cyanide	— 1.2 "
Sodium Cyanide	— 7.5 "
Soda Ash	— 4.0 "
Ammonia	— 0.16 "

TEMP. : 70°F.
C. D. : 5 amp/ft²
TIME : 1 Hour
ANODES : Brass — 80:20

pH	*Cathode Composition* % *Copper*	% *Zinc*	*Anode Efficiency* — %	*Cathode Efficiency* — %
8.2	91.0	9.0	44.4	51.3
8.6	89.8	10.2	17.6	50.3
9.0	88.5	11.5	16.4	50.7
9.4	80.2	19.8	20.2	57.4
9.8	88.6	11.4	21.2	49.8
10.2	80.6	19.4	17.7	50.2
10.6	73.3	26.7	17.0	52.7
11.0	—	—	30.1	—
11.4	73.7	26.3	21.3	48.9
11.8	74.8	25.2	24.0	58.8
12.2	58.7	41.3	26.3	67.5
12.6	64.3	35.7	39.1	58.0
13.0	52.7	47.3	28.3	56.0
13.4	48.2	51.8	38.2	63.6

TABLE VII — BRASS (Warm)

FORMULA:

Copper Cyanide	— 3.6 oz/gal
Zinc Cyanide	— 1.2 "
Sodium Cyanide	— 7.5 "
Soda Ash	— 4.0 "
Ammonia	— 0.16 "

TEMP. : 105°F.
C. D. : 5 amp/ft²
TIME : 1 Hour
ANODES : Brass — 80:20

pH	*Cathode Composition* % *Copper*	% *Zinc*	*Anode Efficiency* — %	*Cathode Efficiency* — %
8.2	97.3	2.7	100.8	47.2
8.6	96.0	4.0	119.0	43.7
9.0	95.2	4.8	124.5	43.4
9.4	89.2	10.8	73 0	45.2
9.8	92.0	8.0	92.9	43.3
10.2	85.4	14.6	90.3	38.8
10.6	64.4	35.6	57.7	47.3
11.0	89.5	10.5	76.3	46.4
11.4	89.8	10.2	99.0	40.7
11.8	93.1	6.9	82.4	54.9
12.2	80.4	19.6	62.1	53.1
12.6	51.4	48.6	47.2	31.6
13.0	56.2	43.8	98.3	39.9
13.4	44.2	55.8	142.7	34.7

deposit obtained when a solution was operated at different pH values. The solution he used had a different composition from the one run in this research. He added the zinc as a chloride and also made additions of ammonium chloride to the solution. There is the probability that some of the "spotty and non-uniform" deposits were due to the presence of a chloride in the solution. Addicks, in the discussion of the cause of "spotting-out" of electroplated coatings, stated (Transactions Electrochemical Society, Vol. 29., p. 376, 1916) that copper solutions containing a chloride are sensitive to light. He said, "In the work I have done in the plating copper out of copper solutions, where chlorine was present, some cuprous chloride comes down at the cathode; the cathode looks normal in the solution, but by putting it in the sun with anything placed over it, it will take a print of the object, in a few minutes. In the cyanide solution these chlorides would be in solution, but when you wash such a cathode some of the chloride may be precipitated and show nothing at the time, but the next day all of this blackening appears." It would seem from Addicks' experience that the addition of a chloride to a solution containing copper is not advisable. This may be a contributing factor in "stain" spotting-out.

There is a difference in the color of the brass deposits obtained in this work when a solution was operated at the same pH value as Springer used. From pH 9.8 to 10.3 his deposits "came out a beautiful brassy yellow". Coats obtained a greenish yellow between pH 10.1 and 12.1. He had a metal ratio of about 70% copper and 30% zinc in both the solution and the anodes. In this work in which the solution and the anodes were 80% copper and 20% zinc, the color of the deposit obtained between pH 8.2 and 10.2 had a reddish color. At pH 10.6 it was greenish yellow but at 11.0 to 11.8 the color was again reddish. The best color was had at pH 12.2, while above that pH the color was not so good.

The color of brass is due to its copper-zinc ratio. The deposits from the solution run warm were assayed, and Coats' statement that those containing over 40% and under 20% zinc were red

in color, was confirmed. The only yellow brass color obtained was when the deposits contained 80% copper and 20% zinc, i.e., a color that would match a fabricated piece of high brass.

That the copper-zinc ratio of the deposit from an 80-20 brass solution run at room temperature with 80-20 anodes was radically affected by the pH value of the solution, was proved. At pH 8.2 the deposit contains 98% copper and 2% zinc; at 10.6 — 65% copper and 35% zinc; at 12.2 — 80% copper and 20% zinc; and at 13.4 — 45% copper and 55% zinc. This apparently indicates why so many times the desired color could not be had even when the solution has the correct composition. (Fig. 6 — see page 728) (Table VI)

When the pH of a brass solution is above 13.6 it may refuse to plate. The addition of an acid salt, e.g., sodium bicarbonate, will correct the pH and the solution will function at once. This condition has been seen when the chemical composition of the solution was as near a standard condition as could be made. Some acid salts have very little effect on the pH of an alkaline plating solution. Sodium bisulphite added up to six ounces per gallon to a brass solution only changes the pH value from 10.3 to 10.1. Sodium bisulphate has a greater effect, but it is not known what effect the sodium sulphate remaining has upon the solution.

To obtain further data a "warm" and a "cold" solution were run, and the anode and cathode efficiencies compared. In a cold solution the cathode efficiency ranged from 31.6% to 54.9%; in the warm solution, from 49.8% to 67.5%. There is marked difference in the anodes efficiencies. In the cold solution they were from 17% to 44%; in the warm solution, from 47.2% to 142.7%. When the ratio of the copper and zinc in the cathode is taken into consideration, the latter figure is not surprising, as where the copper content is high in a very alkaline solution, pH 13.4, the anodes were badly coated. It was at that pH that the anodes in a copper cyanide solution took on a green coating. (Fig. 7 — see page 729) (Table VI; Table VII).

The anode and cathode efficiencies of a cold and a warm solution was determined. (Fig. 8 — see page 729) Those that were nearest

the same were obtained when the solution had a pH value of 12.2 and the copper-zinc ratio of the cathode was 80-20. The anode efficiency in the warm solution was 62.1%; the cathode, 67.5%.

The study of the pH of alkaline plating solutions had proved most interesting. This research can be considered exploratory. Further investigation should be made of each solution so as to obtain the optimum plating conditions. It will be found that in a brass solution the optimum pH value will depend upon the metal concentration, the temperature of operation, the copper-zinc ratio of the anode and the solution, and the effect of addition agents, as the color of the deposited metal is a yard-stick by which the results are measured. The influence of temperature is indicated by the color of the deposit from the cold and warm solution. The deposit from a cold solution run at pH 13.4 is the same in color as that obtained at pH 12.2 in a warm solution, although the copper-zinc ratio is different. This may be due to crystal size and orientation.

There is also evidence that blisters and peeling of deposits from any alkaline plating solution may be due to its pH value rather than entirely to cleaning. In a brass solution the steel plates run at pH 10.6 blistered every time, until very heavy etching of the steel was resorted to, which probably gave an anchorage and not a true bonding. This pH value, 10.6, seems to be a critical point of operation. The color and character of the deposit and the copper-zinc ratio is distinctly different from those preceding or following this pH value.

This work would not be complete without determining the effect the pH of a solution has on the structure of the deposit. Those from cyanide copper and those from cyanide copper and rochelle salts solutions at pH of 8.2 for low and 13.4 for high, indicate that the crystal structure is affected by the pH. (See Figs. 9 and 10, Page 730.)

The only conclusion that can be drawn is that all plating solutions, both acid and alkaline, should be operated under pH control.

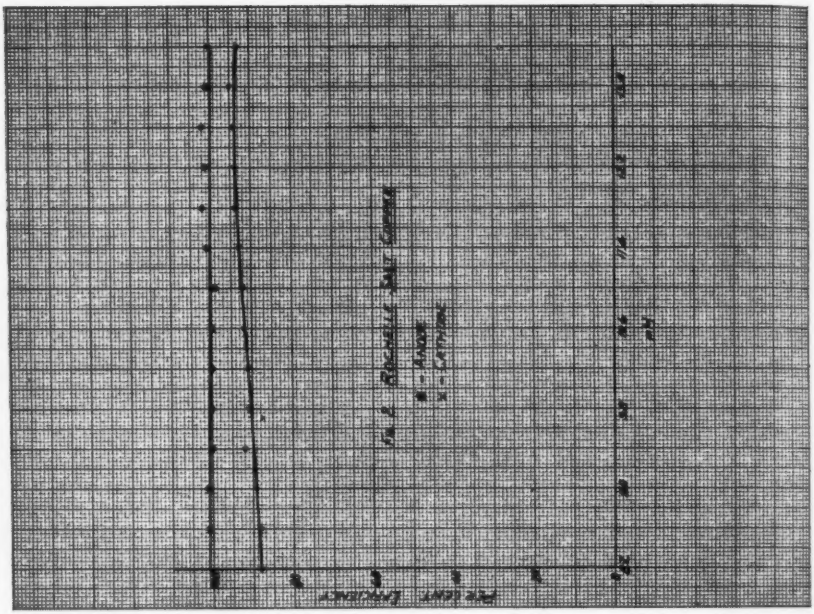


Fig. 1. Rochelle Salt Solutions
● = Anode
× = Cathode
PER CENT EFFICIENCY
pH

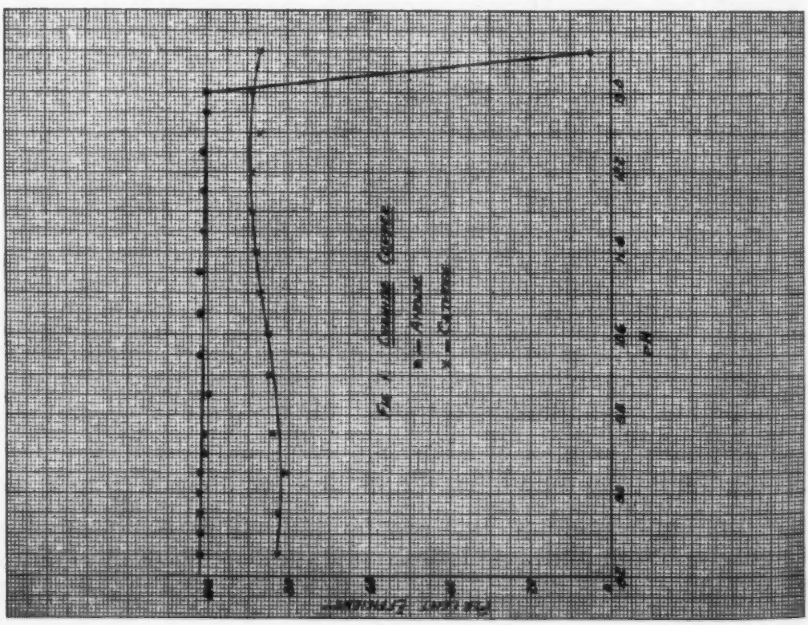
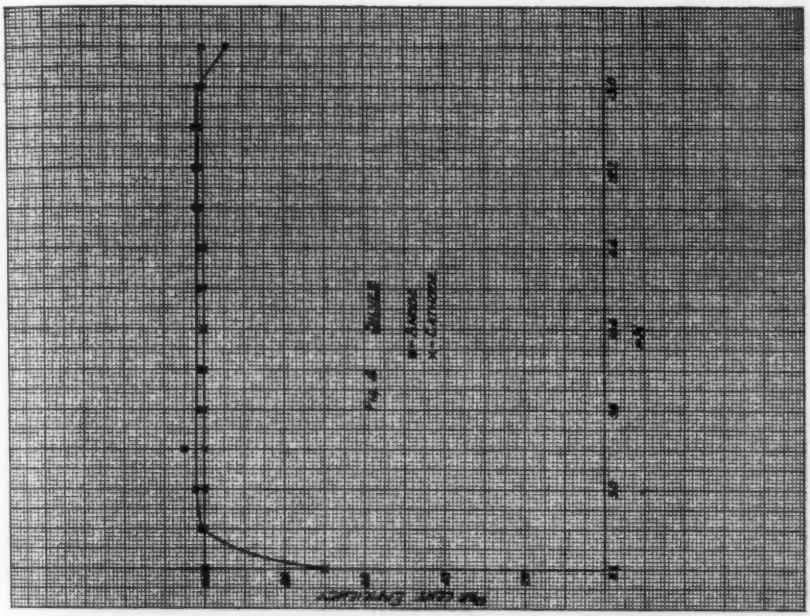
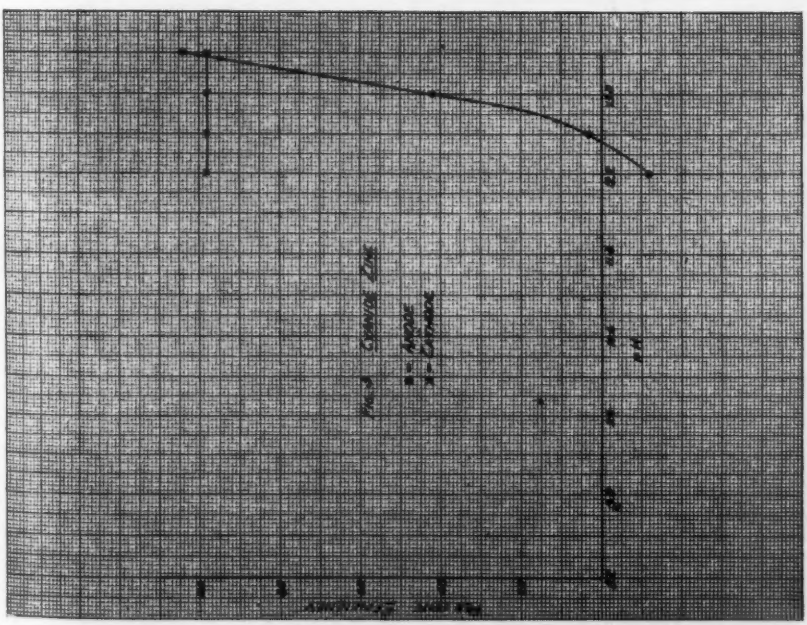


Fig. 2. Citrate Solutions
● = Anode
× = Cathode
pH





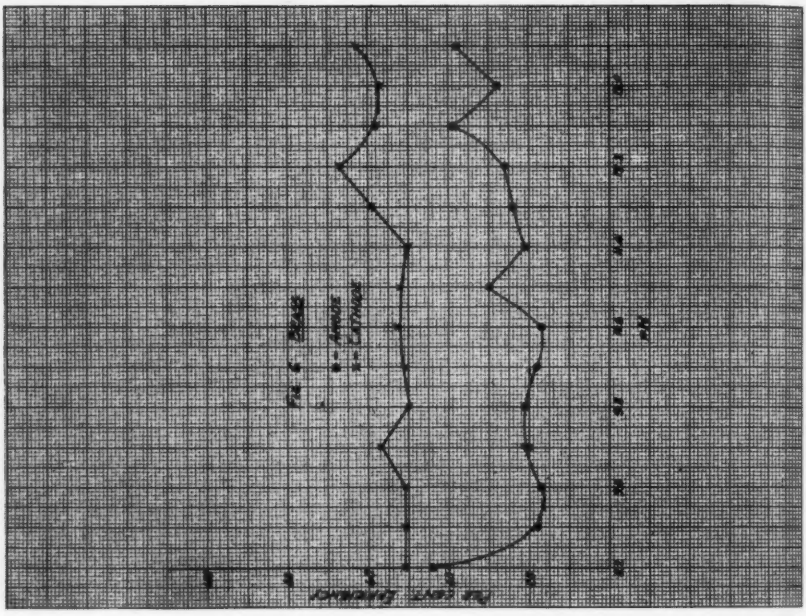


Fig. 4. Brass
x = Acid
+ = Cyanide

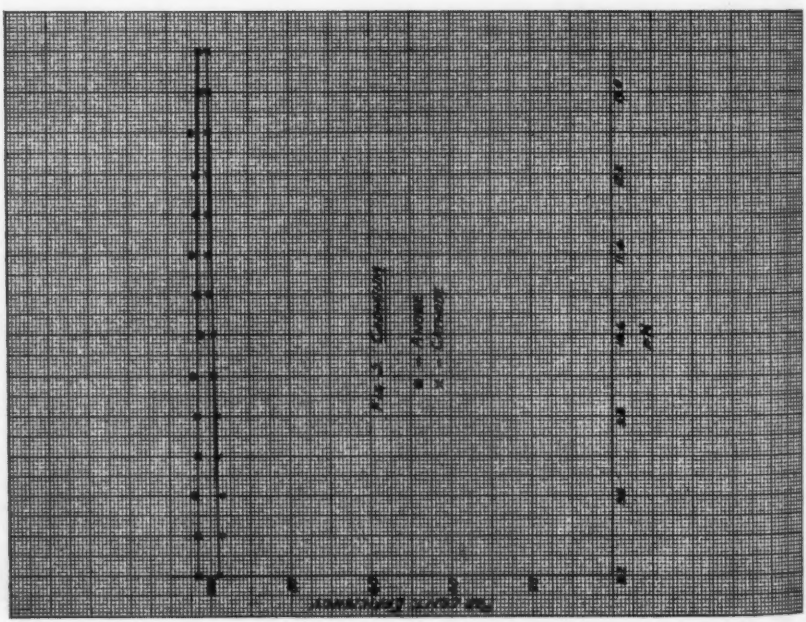
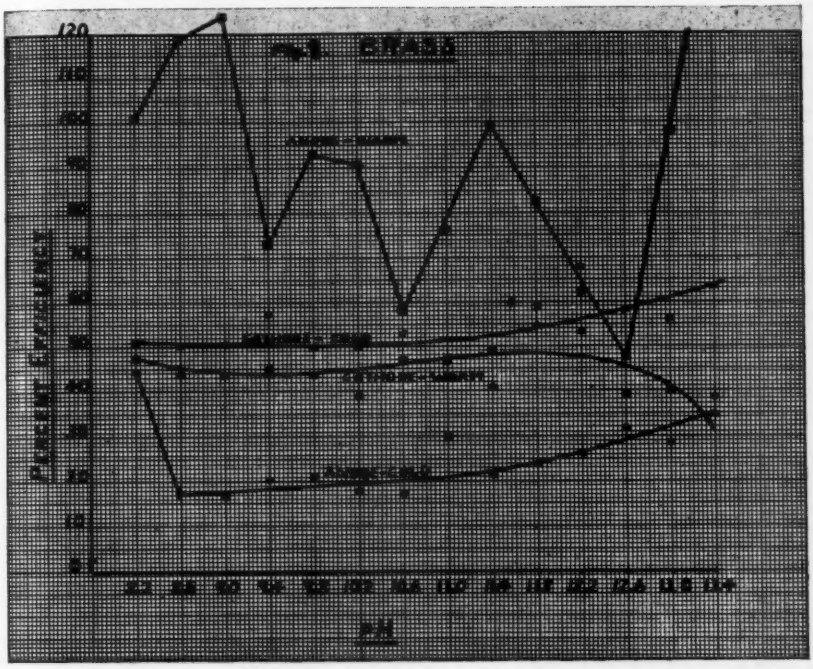


Fig. 5. Cadmium
x = Acid
• = Cyanide


BRASS
Percent Efficiency
PH

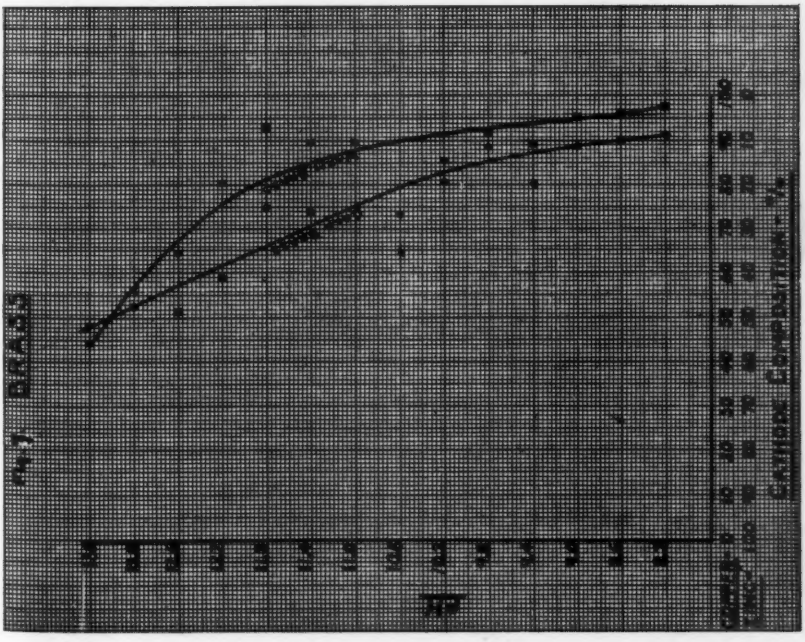

BRASS
Oxidation Conditions
PH

Fig. 9

pH 8.2 **pH 13.4**

Cyanide Copper
× 500

Fig. 10

pH 8.2 **pH 13.4**

Cyanide Copper + Rochelle Salts
× 500

CHAIRMAN SERVIS: You have heard this very interesting paper by Mr. Hogaboom, and I assume there are quite a number of questions to be asked.

MR. WERNLUND: Mr. Hogaboom presented a very important paper, and has pointed out the vital function of pH in plating solutions. Dr. McGuinnis told us, some months ago, that they now have a commercial apparatus for controlling automatically the pH of solutions to within about four-hundredths of a pH. This would be very useful, of course, in nickel plating, but it would be equally useful in all alkaline solutions.

The importance of the pH has been disregarded by the physiological chemists until just recently. Now they find it is of very vital significance. Two or three years ago we had one electro-metric pH apparatus in our laboratory. Now we have four, and they are always in use.

To Dr. Blum I might state that a pH method for controlling the pH in alkaline solutions would have very great value. Today, Mr. Hogaboom has used the electro-metric method, and we can see the results when they get up to 12.0, or a little above 12.0, and yet we like the electro-metric method very much because of its simplicity, rapidity and reproductibility. You platers can see why brass plating is so difficult.

Mr. Hogaboom has shown you that the copper anode fails to function above a pH of 13.0, and the zinc anode begins to function well at a pH of 13.0. In the brass anode you have copper and you have zinc. If the pH is lower than 13.0, your zinc goes to the anode and you have oxide. If you go above 13.0 your anode coats with copper compounds and you are up a tree.

In our work we found that in a brass solution, when it is made up new and does not contain carbonate, that a little caustic soda — half an ounce of caustic soda, for example — gets you into a mess, as you platers know. If you add four or six ounces of soda to that solution you can neutralize the bicarbonate and your brass solution will run very nicely at a pH of 10.0 and 11.0. The carbonate there is a buffer.

I should like to ask Mr. Hogaboom what current densities were used on the current efficiency curves on the copper.

MR. HOGABOOM: About fifteen amperes.

MR. WERNLUND: On the brass it was five?

MR. HOGABOOM: Yes.

MR. WERNLUND: One thing more. The brass solution is very versatile in the hands of a plater. If the cathode current efficiency and anode current efficiency could be stepped up to 25 amps/ft^2 the production of a given unit could be doubled or perhaps trebled. That is a very important point for you platers, because it will increase brass plating — could increase it very greatly if that point could be ironed out. Mr. Hogaboom showed, I believe, in that last slide, the wide variation on anode and cathode current efficiency; to get the anode and cathode efficiency up to those in the cadmium solution.

MR. R. OLSEN (Alternate, Milwaukee Branch): Mr. Hogaboom referred to blistering on steel in the pH range, and I would like to ask this question: Would there be any difference in plating zinc die castings in a pH range which had a little trouble in blistering on zinc? We checked our cleaning thoroughly and we did not have any trouble in plating steel or brass or copper, but we did have a little trouble with little, fine blisters in plating zinc base die castings.

MR. HOGABOOM: Of course, there is a difference in voltage, and there would probably be a difference in effect in the current used. As to the pH value of zinc, I think you may anticipate a paper to be published, I believe during this coming year, on zinc die castings. I believe one of the greatest causes of blistering of zinc base die castings is something that may be called a skin that is on the die castings. Recently, in operating die castings in which the casting was plated in a copper solution, blistering occurred. It was found that by dipping the work into a fifteen per cent hydrochloric acid before buffing that the blistering entirely disappeared.

What brought about that suggestion, if I may speak about the zinc-aluminum-mercury anode, was when that anode is put into the solution at first it has a very dark color, and about two or three days later it will brighten up and will stay bright. That dark color is due to a film that is on the anode. That film is very valuable, because it prevents mercury from sweating out while the anode is in stock, but just as soon as that film is off, the mercury will sweat out in normal temperatures.

There is some work being done on that subject. This skin has a materially different composition and different physical

characteristics than the body of the basis metal. I think that is the cause of the blistering of die castings rather than the cleaning or the solutions.

DELEGATE F. J. HANLON: Mr. Hogaboom, just a little addition to what you said relative to the skin on die castings. As you know, for many years we have done nothing except plating die castings, and recently we have run into some of this difficulty of which you speak. On investigation we find that a great deal of the blistering is caused by the treatment of the dies before the castings are made. Heretofore, in the manufacture of die castings the operators, in their endeavor to make die castings fast and keep the dies from plugging up, have been using a solution of caustic soda which, after the die has been in use for several years, permeates the die and, under the pressure of the hydraulic machines, a little of it is forced to the surface, and unless the surface is washed thoroughly and baked before prepared for plating, you have difficulty.

Some bright scholar decided that an oxide of zinc solution rubbed into some of those dies, or washed on the dies before and after several shots of metal, would be of great assistance. When it comes out the casting is warm and it is hung up and usually baked, and that comes on the outside and has given a lot of people the mistaken idea that it is a skin. In reality it is a sort of chemical shield to the casting, and it was not really intended as such; it was just to clean the die.

MR. HOGABOOM: I am very thankful to Frank for telling us about that. It has been noted that some die castings will work perfectly, while other die castings will work very badly.

MR. SODERBERG: This is a most interesting paper, which leads me to make a few comments, in view of the fact that it is, should I say, exploratory in its nature. We are beginning to get some sort of a picture, but not, as yet, a very clear one on a number of subjects.

I want to point out, following Mr. Hogaboom's example, starting with nickel, that for quite some time we were limited to a very narrow range of pH. Today we do not feel so limited, as you know. All bright nickel solutions are operated outside what was originally considered the best pH range. We have the problem not only of precipitation of hydroxide of nickel, but also precipitation of impurities.

Now, in your paper I notice some peculiar conditions in that in some cases a pH change had no effect on efficiencies — no apparent effect — and I am wondering if it is not all a question of small amounts of impurities, and whether or not, in the future work, we will be following Mr. Meyer's very good expression, "It is necessary to control those impurities".

I would suggest that one should start out with as pure chemicals as are possible to obtain — you might have to make them yourselves. In some of our work we have to make up pure chemicals ourselves, then start getting analyses of the materials available commercially. Then add those materials, each one at a time, in increasing amounts. I believe we are going to find, when we get all through, that in many cases we can plate from cyanide solutions over a very wide pH range; if we have pure materials present in the bath that is going to decide what pH range we can operate. That means, probably, that the purity content of our solution will vary. We are not always operating the same solution at the same pH one year as the next year.

MR. HOGABOOM: What Dr. Soderberg said is correct. We should study that point. There is another point that we should study, that Mr. Meyer did not cover, and that is the effect of colloids. You probably know that in copper refining, glue is commonly used as an addition agent. It is very expensive; the glue lasts only twenty-four hours. If they used gulac the effect is quite constant. In the copper electrolyte there is some arsenic; with the use of glue there is practically no arsenic in the deposit; with the use of gulac the content of arsenic is very high, so high that it ruins the copper. We not only have the effect of small metallic impurities, as Mr. Meyer and Mr. Soderberg have brought out, but we also have many other things.

DR. BLUM: Some more unsolved problems. This work is really opening an entirely new field, and it is rather strange that so little attention has been given to the pH of alkaline solutions in the face of its recognized importance in acid solutions. One reason, I think we can safely say, is that in the first place the alkaline solutions are so much more complicated, not only in the number of things added, but in the number of compounds that may be present in these solutions. In the

second place, the actual hydrogen ion content of all of these solutions, when you have a pH of 10 or of 13, is so small that you would not anticipate as great an effect as you would on the other side, where the difference in pH represents a relatively large amount of hydrogen ions which might be discharged along with the metal.

A suggestion I have to make on the research is to extend and correlate these experiences with those acid solutions.

If you have a solution of pure nickel sulphate, it is in equilibrium with nickel hydroxide at a pH of, say, about 6.8. In other words, if you get the bath more alkaline than that, you will precipitate the nickel hydroxide. It is no coincidence that nobody tried to run a nickel-plating solution at a pH above 6.8, because then precipitates form unless enough ammonia is added to raise the pH up to 8, when a different series of compounds is formed.

What is the pH of a pure silver cyanide solution? I am just guessing it would probably be about 8.5. Mr. Soderberg touched upon wide ranges. It is rather interesting that we started out on nickel plating and said that it was necessary to keep a very narrow range, between 5.5 and 5.8, or something like that. Then Bill Phillips and some other people came along and, instead of changing the pH a little bit, they dumped in a lot of acid and went to the other extreme and found there is another range. Nobody can explain why the best pH ranges for nickel plating are separated by a less favorable range.

I am bringing that in to show you that in cyanide solutions, there may be one range in which one form of solution works, and another range for another solution. I am not giving you any answers; I am just giving you problems.

MR. HOGABOOM: If I may comment on Dr. Blum's statement about pH in the nickel solution, if a nickel solution is run at pH 5.0 you will find that the coating over the anode is black, which will assay around 13% nickel oxide and nickel peroxide. If you get it down to a pH of 3.0, you will have a coating of about 35% nickel oxide and peroxide. When you get it into the high acid range, e.g., pH 1.5-2.0, the nickel oxide and nickel peroxide is taken into solution as fast as it is formed, and that is the advantage.

MR. HUESSNER: I was very much interested in Mr. Hogaboom's paper on pH of baths, because I think they should be used not only in the laboratory but also in the plant. We can go back to the time of cyanide copper ratios and we find that in industry all kinds of results were obtained on getting 10% efficiency and under 70% efficiency. Well, about that time some of the men in the industry decided there was some factor controlling that, and it was generally found that was a pH, and that is probably when the pH was first used in industry in alkaline solutions.

Mr. Hogaboom speaks of the origin of the rochelle salts bath. We can go back over the literature, and we find a good many people have tried rochelle salts baths, and usually there were two things lacking to make it work successfully. There was an improper ratio of copper to cyanide, and no one, until the last five years, had attempted to control the pH in rochelle copper salts in production. I do not know of anyone, as Mr. Hogaboom suggested, using such a low current density in a bath, because it was generally developed in industry to use high current density. We know, in the old type cyanide bath, that as you got up to high current densities you lost entirely your current efficiency. Well, that is not true with the rochelle salts bath, which you can operate at 60, 70, 80, or as high as 90 amps/ft^2.

I know of one job that in five minutes they are required to put on a minimum of three-tenths of a thousandths of copper. Well, you know, in a minute your average copper is considerably higher, but I do not believe in industry we are able to get an average of 90% current efficiency, so if you do try the bath, do not try to get 90% current efficiency, because you will probably be disappointed.

Some years ago it became necessary, when mounting rubber onto special brass plates, to get away from the low current density, and several plants with which I am very familiar are operating their brass plants at 30 up to as high as 35 amps/ft^2. Since that time I believe they have very accurately controlled their pH, because that was the fundamental factor in rubber adhesion to brass. The brass is put on there for its adhesive purposes, and I think that it is possible to operate these at

30 and 35 amps/ft^2 and do it day in and day out. People in the rubber industry are compelled to do that because of the vast amount of production.

I have one question to ask Mr. Hogaboom: What method was used in obtaining pH with a ratio? Was there a color method and electro-metric?

MR. HOGABOOM: The electro-metric did not work out well, so there was no comparison made. Mr. Huessner spoke about the work of current density. So far as that work is concerned, it took the better part of a year, and if it had been carried out along the lines of everything that has been suggested this morning, it would have taken us until 1950 to do the work.

DELEGATE HIRSCH: I was interested, Mr. Hogaboom, in your cyanide copper solution. I have been fooling with cyanide copper solutions in a manner similar to that we reported the other night in silver solutions, trying to find the cathode efficiency with reference to sodium carbonate and rochelle salts, and, as Mr. Huessner has said, I have not been able to find cathode efficiency as high. So I would like to ask Mr. Hogaboom a question: What could we expect the cathode efficiency to be if there were present, we will say, five ounces of sodium carbonate and rochelle salts and about 1.5 ounces of sodium cyanide in the salt solution?

MR. HOGABOOM: I cannot answer Mr. Hirsch directly, but I will say this: In an investigation which is being carried on very successfully, they are finding that low metal concentration solutions are far more efficient than high metal concentration solutions, and that you can use higher current densities. Somebody, one of these days, will present a paper upon the difference between low metal concentration and high metal concentration solutions. I am wondering if that is not true all the way through if we consider all sides. Too often we have just one point of view, and have carried that to an extreme. What we want to do is to have research work and have a balanced condition. This paper, as you realize, is exploratory.

CHAIRMAN SERVIS: I am afraid if we continue this discussion too long we will not have time for the other papers. We have another session this afternoon, and in order to get out of here

on time we will have to hurry, so please make your questions as short as possible.

DELEGATE WOOD: The subject of anode and cathode is pretty close to my heart, and I should like to suggest the possibility that pH is also a very common factor in migration of solid dispersion. I think we are all inclined to think of that in connection with alloys and plated solutions, rather than the possibility that in organic metal salts may also be dispersed. It is pretty well known that pH can affect such migration or such dispersions, and I think it should not be overlooked that it may be a factor in this case.

MR. CALDWELL: I am wondering if Mr. Hogaboom has worked out the current, showing the effect of pH on the formation of sodium carbonate, and if there is not a possibility of reducing the sodium cyanide from the standpoint of carbonate formation, as the carbonate may form from the sodium hydroxide in reference to sodium cyanide.

MR. HOGABOOM: The only addition of sodium hydroxide made was to correct the pH. I read a paper several years ago on brass plating and it showed the operation of a 2,300 gallon solution at a temperature of about 100°F to 105°F. The current density was about 5 amps/ft^2 on a full automatic control with a drag-out that was practically very slight. It was found that that carbonate content in nine months increased from 4 ounces to 32 ounces per gallon. That was brass plating!

I had intended to bring this up in reference to the pH of brass solution. We have experimented in the past with brass, not as a decorative plate but as a protective plate, sandwiched between five plates of nickel. That brings out a test, and if you want to know whether your plate is truly homogeneous or not, plate your brass in a low pH nickel of high metal content, buff and chrome, and note whether there are any minute blisters showing in twenty-four to forty-eight hours. We found, in the pH, that you mis-operated with a high pH of around 12.5 up to over 13.0, which allowed a larger variation in temperature and current density, but we did get a better plate by dropping down to the neighborhood of 8.5 pH, but that was the time when we abandoned the brass. I am very interested in this, because there has been so very little pH control on alkaline.

CHAIRMAN SERVIS: Thank you, gentlemen.

A Résumé *of* Silver Plating

By F. C. MESLE

Oneida Community Co., Niagara, N.Y.

Read at the New York Convention 1937

WHEN requesting this paper, my good friend, Mr. George B. Hogaboom, suggested that I discuss under the above topic such factors as:

A. The composition and control of silver plating solutions, reviewing some previous work dealing with Potassium Cyanide and Potassium Carbonate.

B. The influence of current density and temperature on the color or structure of the deposit.

C. Controlling the distribution of the deposit.

D. Methods for measuring the thickness of the deposit.

Quality silver plating begins with quality finish on the surface of the base metal to be plated. Grease buffing on a rag wheel, using tripoli as the abrasive is still the approved method in putting the final finish on tableware prior to plating.

Plating begins by cleaning the surface to be plated. Soap, in my judgment, is still the best medium for removing the tripoli, then an alkali for removing the soap, then Cyanide and Acid (Hydrochloric about 15%) for removing the oxide films. If the surface is chemically clean and remains chemically clean until metal is actually electrolytically deposited on the surface, the adhesion of the deposit will be perfect. There is no need to etch the surface to give "anchorage" to the plate to assure good adherence.

It is generally assumed that the plated metal will adhere better to a coarse finished or etched surface than it will to a fine finished or highly buffed surface, because the coarse or etched surface gives "anchorage" to the plate and so improves the adherence. (When such anchorage is necessary, as it seems to be in plating on aluminum, it is because the bond between the base and the plated metal is almost entirely mechanical, and at best, poorly adherent.) In fact, the adherence seems to be better on the highly buffed surface than it is on the coarse or etched surface.

Different metals require different cleaning treatment. When copper, steel, nickel silver and Britannia metal are all cleaned in the same cleaning solutions at the same time, nickel-plate may adhere well to the copper and not at all to the steel and Britannia metal. If these same pieces are plated with silver, the adherence may be good on all four metals. If one side of the above cathodes is coarse finished or etched and the other side buffed, the adherence will be better on the fine finished surface for the same cleaning solutions and processing.

Silver "strikes" are necessary because of the tendency of the silver to deposit by emersion when enough silver is present in a silver cyanide solution to do good plating.

This deposit by emersion does not adhere to the base metal; therefore, any electrodeposit put on this emersion will strip or peel from the base metal. A strike solution, therefore, must have so little silver that there will be no deposit by emersion. The amount of silver that can be used will depend on the metal to be plated.

If silver is to be plated directly on nickel silver, a strike solution should have from .1 to .15 oz. of silver per gal. solution and 7 to 9 oz. of cyanide. In this case, it is best to use a second strike with from .3 to .5 oz. of silver and 7 to 9 oz. of cyanide per gal.

If the nickel silver is first plated with nickel, as is frequently done on flat tableware, then the second strike only need be used; and if a mercury dip is used prior to striking, the silver in the strike could be as high as 1 oz. per gal. Many platers use such a dip, but there is nothing in my plating experience that would recommend using a mercury dip.

The composition of an efficient silver plating solution must be determined by the class of work that is to be plated. If only a thin deposit of silver is required on large production items, like auto headlight reflectors, a solution with a minimum of silver and cyanide should be used. One ounce of silver and two ounces of cyanide or less per gal. should be used, otherwise more silver may be taken from the solution as "drag out" than is deposited on the work.

I propose to deal with quality plating of hollowware and flat tableware, on which a deposit of from 5 to 30 Dwt. of silver is required per sq. foot of surface plated.

COMPOSITION OF SOLUTION

For this type of plating, the solution composition should be as follows:

Silver	3-4 oz. per gal.
Potassium Cyanide	4-6 oz. per gal.
Potassium Carbonate	4-12 oz. per gal.

During the past twenty years, Potassium Cyanide and Potassium Carbonate have been gaining in favor among silver platers. I first deliberately added Potassium Carbonate when making up a new solution in 1913. At that time, I pointed out some of the advantages, especially the increase in C/D made possible by its use (Ref. 1) and also the improvement in the quality of the plate. The conclusions reached then, have since been confirmed by others. (Ref. 2-3-4)

I have had no good reason to change the conclusion I reached some twenty years ago that "Potassium (Cyanide) is preferred when obtainable at reasonable prices, I think at any price." (Ref. 5) This conclusion has also been confirmed by others. (Ref. 2) In June, 1936, Dr. Egeberg writes: (Ref. 3) "Potassium Solutions cost quite a bit more than Sodium Solutions, but in the long run they pay."

Both Potassium Carbonate and Cyanide are important factors in silver solution composition and are recommended.

Control of Solution is just a matter of arbitrarily fixing the composition standards, checking these standards by frequent analysis, and making the necessary additions of silver or cyanide as indicated by analysis. Except for the loss of silver, due to the "drag out," silver solutions should maintain themselves in silver, if the anode surface used is equal to the average cathode surface plated. If the anodes are agitated, the silver in the solution will increase, if reasonable care is taken that the "drag out" is not excessive. If the solution is in continuous use, the Potassium Carbonate will not build up to a point where it becomes detrimental.

Carbon di-sulphide used as a brightener is still a matter for individual judgment and skill, and it is difficult to standardize its use.

TEMPERATURE AND CURRENT DENSITY

The temperature at which the silver solution is used, has a great deal to do with the uniform color of the plate or its crystal

structure, and as I hope to show later in this paper, this color or crystal structure is an indication of the current distribution over the surface plated.

I wish to again refer to a paper by the author and quote: (Ref. 5) "An increase in temperature of 50% will allow an increase of 60% in C/D or speed of deposit and still do good work."

Egeberg and Promisel say, (Ref. 2) "The production can be increased 50% by increasing the temperature from 70 to 90 degrees F. without any injurious effect to the plate;" quoting again from a previous paper, (Ref. 6) "Effect of change in temperature on possible current density:

Temperature	55	63	70	78	85
Average C/D	5	7.5	10	12.5	15
Cathode Surface	20′	20′	20′	20′	20′
Amp.	100	150	200	250	300"

Not only does the rise in temperature allow the current density to be increased, but it makes necessary an increase in C/D if plating of uniform color is produced. (Ref. 1-2)

The C/D used in plating, determines the nature of the deposit, and the thickness of the silver for a given length of plating time. The C/D that can be used in silver plating is fixed by a combination of at least three factors; composition and temperature of solution and the amount of agitation. Any change in any of these three factors may allow a change in the C/D that may be used. I do not know what the upper limits are. I do know that it is possible to plate silver at a C/D of 200 which would plate a thickness of .0015" of silver in less than three minutes; but for general application this is not, at present, practical.

When discussing Current Densities, we must do so for a definite set of plating conditions, such as the solution used, the temperature, the agitation, the shape of the cathode, and the position of the cathode in relation to the anode.

The average C/D used means little, we must know something of the maximum and minimum C/D at various places on the cathode. It frequently happens that the distribution of the C/D over the surface of the cathode is such that on one part the deposit will be rough due to excess current, and on another

part the deposit will be clouded and white because of low current.

Some recent studies I have made will indicate the trend of the influence of the temperature of silver plating solutions on current distribution, which also means silver distribution of the variation in thickness of the deposit, which is an important quality factor.

GENERAL PLATING CONDITIONS

Solution:	Silver	3.25 oz. per gal.
	Potassium Cyanide	4.84 oz. per gal.
	Potassium Carbonate	8.00 oz. per gal.
	Brightener	?
	Solution Agitated	....

A Cathode $3\frac{1}{4}''$ x $6\frac{1}{2}''$ was bent V shape, the ends 1" apart. This was placed between two silver anodes about 10" apart.

The C/D used was determined at half square inch intervals over the entire surface of the Cathode. The minimum and maximum C/D=the C/D distribution ratio found for a cathode of this shape and for the above plating conditions:

*Cathode A** Temperature 60 degrees F. Average C/D about 6 variations in C/D distribution 1.9 to 9 and a C/D distribution ratio of 1-5 in round figures.

*Cathode B** Temperature 80 degrees F. Average C/D about 25 variations in C/D distribution 1-33 and a distribution ratio of 1-33 (Current too high)

*Cathode D** Temperature 100 degrees F. Average C/D about 13 variations in C/D distribution .23-25 and a distribution ratio of 1-107.

*Cathode E** Temperature 100 degrees F. Average C/D about 20 variations in C/D distribution .35 to 42 and a distribution ratio of 1-112.

The C/D used was determined by the plating time and the thickness plated measured at half inch square intervals over the entire cathode surface. Whatever difference there may be in the thickness of the plate, and the weight due to the difference in crystal structure, the C/D given would be in error by whatever that difference may be, and the distribution ratio would be increased by whatever this error may be.

(*See Table No. 1 on Page 744)

TABLE NO. 1

CURRENT DENSITY DISTRIBUTION ON EXPERIMENTAL CATHODES

Cathode	*Temp.*	*Average C.D. Amp. per Sq.Ft.*	*Variation in C.D. Distribution*	*Distribution Ratio*	*Bright Range*	*Remarks*
A	60	6	1.9 — 9	1 — 5	3 — 6	
1	70	5	.39 — 10	1 — 25	3 — 10	
2	70	10	.45 — 19	1 — 42	3 — 14	
3	70	15				Rough Plate
4	70	20				" "
B	80	25	1 — 33	1 — 33	5 — 15	" "
5	85	5	.17 — 11	1 — 66	10 — 11	Bright at edges only
6	85	10	.56 — 28	1 — 50	10 — 28	
7	85	15	.40 — 30	1 — 75	10 — 30	Corners Rough C.D. 33 and up White
8	100	5				
9	100	10	.28 — 27	1 — 96	15 —	
D	100	13	.25 — 25	1 — 100	15 — 25	
10	100	15	.33 — 38	1 — 115	15 — 38	
E	100	20	.35 — 42	1 — 112	15 — 42	

This variation in C/D distribution causes the same variation in thickness, which is a serious factor in producing quality plate. This C/D variation also puts *emphasis* on the fact that the average weight of metal plated per Sq. Ft. of surface is not the true measure of the quality or durability of the plate.

If the plating on these cathodes was intended to protect the base from corrosion, it would be no better protected than at the point where the plate is thinnest, which in some cases is 1/25 the thickness indicated by the average weight per sq. ft. of surface plated.

Figures 1-2-3-4* illustrate C/D distribution on ABCE.

With this variation in C/D or plate thickness it is evident that before average C/D used can mean very much in relation to quality of plate, we must study our plating condition and learn what the maximum and minimum C/D is for our set of plating conditions. Another reason for knowing this is because the C/D used has an important bearing on the color and structure of the deposit.

For a given condition, the C/D used determines whether the plate is bright, dull or white; and it happens that the white

(*For Figures see Pages 746-747)

plate requires harder buffing to bring up the finish, and where the plate is white, it is also the thinnest.

I now call attention to the influence of the temperature and the C/D on the nature of the deposit.

Lot A — with its C/D distribution 1.9 to 9 and an average C/D of about -6- produced a good deposit ranging from slightly dull to bright — no white plate on this cathode. An average C/D of 6 will produce a satisfactory deposit on every part of the V Shape cathode. The comparatively uniform C/D distribution, therefore, the comparatively uniform color of the plate in silver solutions used at temperatures of 60 degrees or less is no doubt the reason some platers have installed cooling systems in their silver solutions to keep the solutions below 60 degrees.

A solution of the composition mentioned when used at an average C/D of 3-6 generally recommended in text books on silver plating, will produce a more uniform deposit in color and thickness than when used at higher temperatures. The low temperature solution has one serious disadvantage; i.e., the maximum C/D must not exceed 9 for this set of plating conditions to produce smooth deposits. This means that the average must be about 4;— and an average C/D of 4 will plate too slow to meet modern production demands.

To plate quality plate or 10 oz. per Gro. on teaspoons at this average C/D would require 2.7 hours plating time, which is too slow, especially in large production shops where as much as 8000 gross of flatware of various qualities must be plated each week on continuous conveyor plating machines plating from 30 to 45 gross per hour per conveyor unit;— therefore, faster plating at a desired current distribution must be attained. This is done by having elevated temperatures between 80 degrees F. and 90 degrees F., and by so arranging the pieces of work to be plated in relation to each other and in relation to the size and shape of the anodes and the distance from the cathode, to take advantage of the greater variation in the C/D distribution in the higher temperature silver solution, and get the distribution of the current, which means the distribution of the silver over the piece plated as is desired for the quality plate produced.

A

Fig. 1 Outside

5.5	5.0	4.3	4.3	4.3	5.0
5.0	4.3	3.7	3.7	3.7	4.3
5.0	3.7	3.7	3.0	3.7	4.3
6.2	5.0	4.3	3.7	3.7	4.3
7.5	5.5	5.5	5.0	4.3	5.0
9.0	8.0	7.5	7.0	6.5	7.5

Fig. 1 Inside

8	5.5	5.5	5.5	4.3	4.3
6.2	5.5	4.3	3.7	3.7	4.3
5.0	3.7	3.0	3.0	3.0	3.7
4.3	3.0	2.5	1.9	2.5	3.0
3.0	2.5	1.9	1.9	1.9	3.0
3.0	1.9	1.9	1.9	1.9	2.5
3.0	1.9	1.9	1.9	2.5	2.5

C. D. Distribution 1.9 — 9 Ratio 1 — 5 Approx.
Solution Temp. 60°F

B

Fig. 2 Outside

22.0	19.0	19.0	19.0	19.0	19.0	20.0
19.7	18.8	19.0	19.0	19.0	19.0	19.7
20.0	19.0	19.0	19.0	19.0	19.0	20.0
21.6	19.0	19.0	19.0	19.0	19.0	21.6
21.6	20.0	20.0	20.0	20.0	20.0	21.6
24.0	21.6	21.6	21.6	21.6	21.6	26.0
33.0	30.0	28.0	28.0	30.0	32.0	33.0

Fig. 2 Inside

22.0	20.0	19.0	18.0	18.0	19.0	19.0
21.0	15.0	13.0	14.0	13.0	15.0	18.0
20.0	13.0	8.4	5.6	6.6	8.4	18.0
19.0	12.2	3.7	2.8	3.7	5.6	18.0
19.0	8.4	1.9	1.4	1.9	4.7	18.0
18		.94	.94	.94	2.8	18.0
		.94		.94		

C. D. Distribution .94 — 33 Ratio 1 — 33 Approx.
Solution Temp. 80°F

D

Fig. 3 Outside

25.0	22.0	20.0	20.0	20.0	22.0	24.0
20.2	14.1	13.1	12.2	12.2	14.1	23.0
22.5	13.1	11.7	11.7	11.7	13.6	22.0
22.5	14.1	12.2	11.7	11.7	14.1	22.0
20.2	14.1	12.2	11.2	12.2	14.1	23.5
21.6	14.1	13.6	13.1	13.6	15.0	23.5
25.0	23.0	22.0	21.1	19.7	21.6	23.0

Fig. 3 Inside

16.4	14.0	13.6	14.1	14.1	14.1	16.4
14.1	6.5	4.7	4.3	4.3	6.5	14.1
14.1	4.7	1.9	1.9	1.9	3.8	14.1
14.1	3.7	.94	.70	.94	2.3	13.6
14.1	2.3	.47	.47	.47	1.4	14.1
14.1	.94	.47	.23	.47	.94	14.1
16.4	.47	.23	.23	.23	.47	16.0

C. D. Distribution 0.23 to 25 Ratio 1 — 108
Solution Temp. 100°F

2400	Fig. 4 Outside					E	Fig. 4 Inside						
21.7	21.0	21.0	21.0	28.0	28.0		25.0	21.0	21.0	21.0	28.0	30.0	42.0
27.5	19.0	18.0	17.5	18.0	19.6	30.0	17.5 14.0	15.4 11.0	14.0 7.0	17.5 7.7	20.0 8.4	21.0 10	35.0
26.6	19.0	17.5	17.5	17.5	19.0	31.5	11.0	7.0	5.6	3.5	3.5	5.6	28.0
26.6	19.0	18.0	17.5	18.0	19.6	31.5	10.5	5.6	2.1	1.4	2.1	5.0	28.0
27.3	21.0	19.0	19.0	19.0	21.0	31.5	8.4	2.8	2.1	.5	2.1	2.8	28.0
30.8	23.8	21.7	21.7	21.7	23.8	31.5	8.4	2.1	.7	.35	.7	2.1	28.0
32.2	35.0	31.5	31.5	33.6	35.0	42.0	?	?	?	?	?	?	

C. D. Distribution 0.35 to 42.0 = Ratio 1—120
Solution Temp. 100°F

For instance, the front of the bowl of a teaspoon does not need the same thickness of silver as the back of the bowl or the back of the handle. The average size teaspoon plated with 10 oz. silver per gross will have an average thickness of silver approximately .0017″ thick. A study of different plating methods (work done by different manufacturers) shows that the distribution of this average will vary from .0005 to .0020 at the back of bowl wear point, for the same total weight of silver per spoon. (This variation is without sectional and reinforced plating by separate plating operation.) This fact again indicates that the total weight of metal deposited on a teaspoon is not the measure of its quality.

Back to the influence of temperature on the nature of the deposit.—

Cathode B With a C/D distribution of 1-33 and used at a temperature of 80 and an average C/D of about 25 other plating conditions, same as A — for this condition a white plate was produced where the C/D was less than 4; bright plate was produced where the C/D was between 5-15; dull but good plate where the C/D was between 16-19; rough plate where the C/D was more than 22. For the Cathode B plating conditions to produce a uniformly bright color deposit of silver, the C/D used must be between 5 and 15.

Cathode D With a C/D distribution range of .23-25 — because used at a temperature of 100 degrees — at an average C/D of about 13 for this condition. White or dull plate was

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produced at C/D less than 15 bright plate was produced at C/D between 15-25.

Cathode E With a C/D distribution range of .35 to 42 at an average C/D of about 20, white plate was produced when the C/D was less than 2; dull plate but good was produced when the C/D was less than 5-15; bright plate was produced when the C/D was between 15-42; no rough plate on this cathode.

For lot E plating conditions to produce a uniformly bright deposit, the C/D used must be between 15 and 42.

As the temperature of the solution is raised, there must be a corresponding rise in the C/D used, if the uniform color plate is to be produced; but as the temperature is raised, the variation in the C/D becomes greater. Therefore, the other factors that help control the C/D distribution must be regulated more closely to get the distribution of silver desired.

CONTROLLING C/D DISTRIBUTION TO PRODUCE THE BEST RESULTS OR RESULTS DESIRED

The measure of quality plate on flatware is not the average weight of silver per Sq. Ft. of surface plated, but the thickness of the plate at the points of greatest wear, such as the back of bowl and back of handle. Quality markings should indicate the thickness of the plate at wear points back of bowl in relation to the average allover plate thickness as has been previously suggested by the author. (Ref. 7)

If teaspoons are racked so that the fronts of bowls face each other, and are about $2\frac{1}{2}''$ apart and the backs of the bowls are toward the anode, and the anode surface used is in an area that is directly opposite the cathode, about 2″ smaller on all sides, the C/D distribution will approximately be as follows: Average C/D 17 — front of bowl 6-8, back of bowl 18-20, back of handle 20-25. To use this maximum C/D of 17 — in solution and agitation mentioned above, the temperature of the solution should be about 85 degrees F. to keep all parts at a C/D, that is within the bright plating range. If at this average C/D the temperature went down to 80 or less, rough plating from excess current at end of handles would occur. If the temperature went up to 100, the fronts of bowls would plate white and only the

ends of the handles would plate bright. The addition of carbon di-sulphite would affect the C/D distribution.

Controlling the current distribution on hollowware articles is more difficult because of the variation in shape, but with a little care, the C/D distribution on the outside can be kept within the bright plating range; the inside cannot generally get high enough C/D to plate bright, unless an anode is inserted inside the hollowware piece.

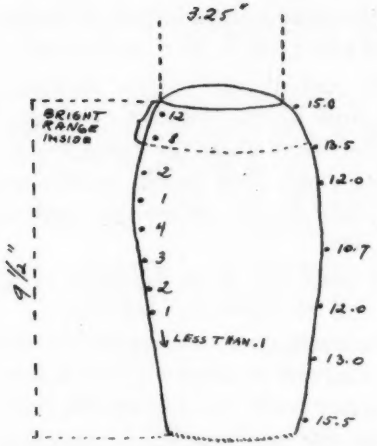
The amount of metal plated on the inside is determined almost entirely by the size of the open end (the sq. in. area) or the volume of Solution available to convey the current into the inside. If the Anode and Cathode position were such that the current was distributed uniformly over the surface of a cube, and if the cube was hollow and one side was removed so that plating was done on the inside, then the total silver plated on the 5 sides of the inside would be only 1/6 of the total silver plated. The surface area plated would be approximately the same on the inside as on the outside, yet the inside would receive only 20% as much silver as the outside. The throwing power of the solution will determine only how this 20% is distributed over the surface of the inside. Under average conditions, about 90% of the total metal plated on the inside would be plated on 25% of the inside surface near the open end of the cube. This leaves very little silver to be plated on the other 75% of the inside surface. When the open end is smaller than the hollowware piece is deep, "Bobbing" should be done.

The C/D distribution on a cocktail shaker 9½" deep, about 5½" at widest place, and a 3" opening at one end is shown on Fig. 5*. Here the C/D distribution varies from less than .1 to 15.5, and the distribution ratio is 1-155.

Fig. 6*, illustrates the C/D distribution over the surface of a 15" platter. One half of illustration indicates C/D distribution when platters are racked, so that the fronts face the anode; the other half when platters are 5" apart and edges toward the anodes. For the same average weight of silver, the quality is up 100% when front of platter is made to face the anode.

The variation of C/D distribution on a few hollowware pieces plated by different manufacturers may be of interest:

(*For Figures see Page 752)



C/D Distribution Amps. Per Sq. Foot
On Cocktail Shaker Body
Solution Temp. 75°F.

FIG. 5

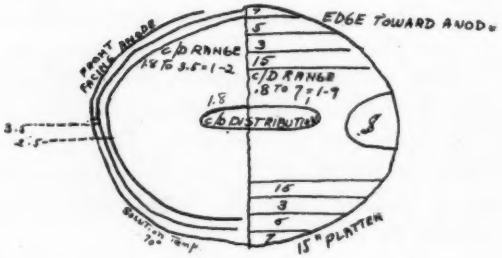


FIG. 6 — SLICE

Manufacturers								*If plated to Avg. 6 Dwt. per Sq. Ft. variation would be*
A	Coffee	Pot	(outside	only)	C/D	Ratio	1-2.6	3-8 Dwt. per Sq. Ft.
B	"	"	"	"	"	"	1-6.6	1½-10 " " " "
C	"	"	"	"	"	"	1-2.0	4-8 " " " "
D	"	"	"	"	"	"	1-6.8	1.6-11 " " " "
A	Veg.	Dish	"	"	"	"	1-5.5	2-11 " " " "
B	"	"	"	"	"	"	1-3.7	2.4-9 " " " "
C	"	"	"	"	"	"	1-5.0	2-10 " " " "
D	"	"	"	"	"	"	1-4.6	2.4-11 " " " "
A	Platters		"	"	"	"	1-2.2	4-9 " " " "
B	"		"	"	"	"	1-4.	3-12 " " " "
C	"		"	"	"	"	1-2.5	4-10 " " " "
D	"		"	"	"	"	1-5.	2.4-13 " " " "

With variation in C/D distribution indicated above, it is not difficult to understand why clouds of white plate develop on

some parts of the surface, especially when warm weather raises the temperature of the plating solution.

MEASURING THE THICKNESS OF THE PLATE

Because of the variation in the distribution over the surface of a cathode the C/D used only indicates the average thickness of the silver deposit. Quality plate means a minimum thickness that is adequate to protect the base metal against corrosion in some cases and from exposure in others. Flatware generally is plated to prevent the exposure of the base metal. Therefore, the thickness of the plate at the wear points is the measure of its value.

Plating a known thickness of silver at the wear points is the ideal way to produce quality plate. If we learn what the C/D is at these wear points for our plating conditions, we can put on a measured thickness of silver by regulating the plating time to the C/D used. A C/D meter can be used to determine the distribution of the C/D on a Cathode of 1 sq. ft. area and larger.

A C/D meter is an Ampere meter, to which has been attached a cathode of known area. A convenient cathode size is 2" x 3.6" (1/20 of a sq. ft.), insulated on one side. Let us suppose that a 20" platter is being plated and we wish to know how the average C/D used is being distributed over the surface: We can determine this by placing the C/D meter cathode close to the platter with the insulated side toward the platter and note the Amperes flowing at the different places on the surface. One tenth of an ampere on this meter indicates 2 amps. per sq. ft. at that time and place on the platter. We might find that at the center of this platter the C/D meter will show .2 and this will increase as we move the C/D meter cathode toward the edge of the platter, where the meter may show .8 amps. The C/D at center would be 4 and near the edge 16.

The careful use of a C/D meter and time of plating is one way to measure the thickness of the plate. By this method we can plate a measured thickness of silver at any place desired on the surface of the cathode, by measuring the C/D used and fixing the time of plating.

Another method is to treat the article to be plated so that the plate can be stripped or peeled from the cathode, and measure the thickness of the metal stripped off with a Micrometer.

Another method I have used for a long time is to strip the plate in acid — and note the time required to remove the silver at the different places on the surface. To do this, we must learn the stripping speed of the acid used by stripping a known thickness of silver. In principle, this is much the same as the Hull & Strausser drop test method for measuring plating thickness. (Ref. 8)

Another is the chord method I recently suggested (Ref. 7) on which Blum and Brenner made a report. (Ref. 9)

Dr. Blum has brought to your attention at various times, the principles involved in the Chord Method for measuring plating thickness. I think I have now developed the Chord Method to a point where it is better than Drs. Blum and Brenner reported it to be in their Paper of February, 1936. They said: "For coatings less than .0002", the method is not very accurate."

This, no doubt, is true when a 4" radius wheel is used on a flat surface. A larger radius cut would improve the accuracy, especially for thicknesses less than .0002". I would suggest a 10" radius cut be used. This will increase the size of the chord cut to be measured 2½ times over the 4" radius used by Dr. Blum. This would mean that a thickness of .00008" could be measured as accurately as .0002" could be with a 4" radius cut. I know a 20" wheel would be out of the question, but I have here a substitute for a 20" wheel that can be used on your desk for making chord measurements.

To further simplify the use of the Chord Method, I have a Scale** to measure the width of the Chord, and a Table that will enable the thickness and the weight of metal to be plated, to be determined when the Chord width is measured.

The following are comparable results I obtained by the four different methods mentioned above on the same sample pieces measured as near the same place as different measurements could be made:

Thickness of Plate Determined by the Four Different Methods of Measuring

Sample No.	*Micrometer*	*C/D Meter*	*Strip Method*	*Chord Method*
1	.00100"	.00096"	.00085"	.00099"
2	.00120"	.00122"	.00100"	.00119"
3	.00130"	....	.00110"	.00112"
4	.00300"	....	.00240"	.00250"
5	.00310"	....	.00260"	.00320"

(**For Scale see Page 755.)

Scale and Table for Making Chord Method Measurements of the Thickness of Coating on Flat Surface when 10″ Radius Cutting File or Wheel is Used

Thickness in Inches	Width of Chord	Scale	Weight of Metal Plated per sq. foot of Surface						
			Dwt. Silver	Dwt. Gold	Oz. Nickel	Oz. Copper	Oz. Zinc	Oz. Cadmium	Oz. Chromium
.000008	.025		.13	.23	.006	.006	.005	.006	.005
.000017	.037		.27	.50	.012	.012	.010	.012	.010
.000031	.050		.50	.90	.023	.023	.018	.022	.018
.000050	.062		.80	1.46	.036	.036	.029	.036	.029
.000070	.075		1.12	2.04	.051	.051	.040	.050	.040
.000096	.087		1.53	2.80	.070	.070	.056	.068	.056
.000125	.100		2.00	3.65	.091	.092	.073	.089	.073
.000160	.112		2.56	4.67	.117	.118	.093	.114	.093
.000195	.125		3.12	5.70	.142	.143	.114	.139	.114
.000236	.137		3.77	6.88	.172	.173	.138	.169	.138
.000281	.150		4.50	8.20	.205	.207	.164	.202	.164
.000331	.162		5.29	9.63	.241	.243	.193	.236	.193
.000383	.175		6.13	11.18	.280	.282	.228	.274	.228
.000439	.181		7.02	12.81	.321	.323	.256	.314	.256
.000500	.200		8.00	14.60	.366	.368	.292	.357	.293
.000565	.212		9.04	16.48	.413	.415	.330	.404	.330
.000646	.225		10.34	18.85	.472	.475	.377	.462	.377
.000705	.237		11.28	20.57	.515	.515	.412	.504	.412
.000781	.250		12.50	22.79	.571	.574	.456	.558	.456
.000861	.262		13.77	25.12	.630	.633	.503	.616	.503
.000945	.275		15.12	27.58	.691	.695	.552	.675	.552
.001033	.287		16.52	30.14	.755	.759	.603	.739	.603
.001125	.300		18.00	32.83	.823	.828	.657	.805	.657
.001220	.312		19.52	35.60	.894	.898	.713	.873	.713
.001320	.325		21.18	38.60	.966	.975	.785	.945	.785
.001423	.337		22.76	41.53	1.04	1.05	.837	1.02	.837
.001531	.350		24.50	44.68	1.12	1.13	.895	1.09	.895
.001645	.362		26.32	48.00	1.20	1.21	.960	1.18	.960
.001757	.375		28.11	51.24	1.28	1.29	1.02	1.26	1.02
.001877	.387		30.03	54.78	1.37	1.38	1.10	1.34	1.10
.002000	.400		32.00	58.37	1.46	1.47	1.17	1.43	1.17
.002180	.417		34.88	63.65	1.59	1.60	1.27	1.56	1.27
.002257	.425		36.11	65.87	1.65	1.66	1.32	1.61	1.32
.002392	.437		38.27	69.81	1.75	1.76	1.40	1.71	1.40
.002531	.450		40.50	73.68	1.85	1.86	1.48	1.81	1.48
.002673	.462		42.76	77.01	1.95	1.96	1.56	1.91	1.56
.002820	.475		45.12	82.30	2.06	2.07	1.65	2.02	1.65
.002970	.487		47.52	86.67	2.17	2.18	1.73	2.12	1.73
.003125	.500		50.00	91.20	2.29	2.30	1.85	2.23	1.85
.003276	.512		52.40	95.61	2.39	2.41	1.95	2.34	1.95
.003445	.525		55.12	100.50	2.52	2.53	2.05	2.46	2.05
.003604	.537		57.66	105.18	2.63	2.65	2.14	2.58	2.14
.003781	.550		60.50	110.34	2.76	2.78	2.25	2.70	2.25
.003948	.562		63.17	115.22	2.88	2.90	2.35	2.82	2.35
.004133	.575		66.12	120.62	3.02	3.04	2.45	2.95	2.45
.004307	.581		68.91	125.70	3.15	3.17	2.56	3.07	2.56
.004500	.600		72.00	131.33	3.29	3.31	2.67	3.22	2.67
.004681	.612		74.89	136.61	3.42	3.44	2.78	3.34	2.78
.004882	.625		78.82	142.48	3.57	3.59	2.90	3.49	2.90
.005072	.637		81.15	148.02	3.71	3.73	3.01	3.63	3.01
.005281	.650		84.50	154.12	3.86	3.88	3.14	3.78	3.14

CHAIRMAN STERLING: Thank you, Mr. Mesle. That is a very interesting paper. Any questions, gentlemen?

DELEGATE HIRSCH: I should like to know how he bent the file.

MR. MESLE: I gave it to a blacksmith and he bent it. Fortunately, it just curved up the least little bit at the outside edge, and that gives you that sort of a V-shaped cut.

DELEGATE HIRSCH: He did not have to recut?

MR. MESLE: No, just hardening after.

DELEGATE FEELEY: In reference to your quality work on the interior of your parts. The interior of cocktail shakers, for instance. Do you take any precaution to increase that shortage of silver? Do you use a bob?

MR. MESLE: Yes.

DELEGATE FEELEY: Do you use a bob right in the tank or do you plate it afterward?

MR. MESLE: We use the bob afterward. We have this rule: When the width of the opening is not as wide as the cup or pot is deep, then we bob it.

DELEGATE FEELEY: I do not know whether you have gone into hotel work or not, but what proportion do you figure for your deposits on the interior of a quality piece of work? For instance, for a hotel.

MR. MESLE: We figure, adding 15% of the total outside to the inside when bobbing is done, so it gets 15% plus what it normally gets in plating it all over.

DELEGATE FEELEY: For instance, while it is in the tank, if your deposit on the piece is fifteen pennyweight, and you are hanging it in the tank, I do not suppose you are shading or placing your anodes to try to get a high efficiency all around the piece, as the normal plating in itself is a little thick or thin in spots. I suppose you let it go that way, but not on the inside. If there is a fifteen pennyweight allowance, how much of that fifteen pennyweight do you allow while it is in the bath?

MR. MESLE: Whatever it gets.

DELEGATE FEELEY: Whatever it takes, but then what percentage of that fifteen — if you are going to put fifteen pennyweight on the part, you do not put fifteen pennyweight on in the bath. What percentage did you put on at the time of plating in the bath?

MR. MESLE: Eighty-five per cent. You have little or nothing at inside of bottom of a pot when you are plating, it is all up in the neck.

DELEGATE FEELEY: You are thinking of soft metals?

MR. MESLE: I am speaking of nickel—silver.

DELEGATE FEELEY: We have done some plating on nickel—silver. Well, you are speaking of quality and we go to 60% on the inside of a pot and 40% on the outside, and we take care of that in plating, of that proportion. There is about 60% or 65% plated all over the pot, and 35% on the inside of the pot, and we plate that with the bob. I think you would get a lot of benefit out of increasing the heat and in bobbing. You cannot put in too big an anode. I think, if you increase the anode of your plating solution while bobbing on the inside, you might, with a soft deposit, do it quicker. Thank you.

MR. SCHNEIDER: Referring back to the potassium sodium cyanide, I was just wondering how the conclusions were arrived at to determine that the potassium gives you better quality work, and if so, what determines the actual factor in the passing of the silver. Are there any samples to the contrary, or has any work been done with sodium to prove that sodium cyanide is not equally as good to obtain a deposit on quality work?

MR. MESLE: I think that perhaps is best answered by Mr. Hirsch's sample, number three. If you take that for comparison with the same current density as any of the current densities here, you have your answer. There is a decided difference.

MR. SCHNEIDER: I do not mean on an ordinary sample, I mean on work that is in production. I have something in mind which I wish to tell you at this time. Necessity is the mother of invention, and I was wondering when potassium was not obtainable if the quality of work at that time was inferior to the work done with potassium. I was wondering if the manufacturers at that time were prepared to tell their customers that because the material was plated with sodium the work was inferior, or that the deposit or quality of the work was inferior to that when potassium was used.

MR. MESLE: I do not want to convey the idea that the deposit necessarily is inferior, but it is true that in order to bring up this cathode it requires much more labor to put on the finish

when the thing is finally done. Perhaps there is no difference.

MR. SCHNEIDER: That is what I am assuming. Can anybody determine outside of the one who is doing it whether that deposit was obtained with potassium or sodium?

MR. MESLE: Not after it is finished.

MR. SCHNEIDER: Would you assume, without the addition of ordinary silver metal, metallic silver and sodium cyanide, without metallic conditioners or brighteners, there is any difference in getting a quality deposit? I do not mean an ordinary straight plating, I mean where there is no brightness required subsequent to the finish.

MR. MESLE: I would say that if brightener is used that there is less difference between potassium and sodium than when no brightener is used.

MR. SCHNEIDER: Thank you.

MR. PHILLIPS: Do I understand that that is a three-ampere-per-square-foot deposit?

MR. MESLE: That is Mr. Hirsch's example.

MR. PHILLIPS: In a potassium cyanide bath?

DELEGATE HIRSCH: In a sodium cyanide bath.

DELEGATE FEELEY: For some years we have not been able to use potassium. There was a time when we could not get it, and for some years it was too high in price. When I was in England in 1926, the argument over there was very strong in its favor in some of the factories, but I did go into a couple of factories — Walkerhalls, for one, where they had started to use sodium. They were using sodium cyanide also in Sheffield's.

DELEGATE DONALD WOOD (Boston Branch): Some time ago one of my superiors came to me with the information that everybody else was using potassium cyanide, and I was asked to explain why I was using sodium cyanide. First, I made two solutions, chemically equivalent, and placed them side by side. Both were operating exactly the same way. They were treated identically throughout the test that I made. It was absolutely impossible for anybody, including the finisher to tell which solution the work was coming from. That satisfied my superior,

but since that time I have done some work from a little different angle, and I believe that potassium solutions work better. Tonight I am going to say something about that, and I shall wait until then before committing myself. I think there is something in my paper which will shed some light on controversies that have existed so long in the question of sodium and potassium solutions.

DELEGATE HIRSCH: I see that your throwing power is brought in in increasing the cyanide. Does that overcome that in any way?

MR. MESLE: I could not answer that offhand. It would not make much difference, in my judgment.

DELEGATE WOOD: Mr. Mesle, in speaking of the factors in eliminating current density, you stated rather definitely that there were three factors.

MR. MESLE: At least three.

DELEGATE WOOD: I wondered why you omitted the very large influence of brightening. To me, that was as great as any of the other three and should be mentioned.

MR. MESLE: That, however, comes under the heading of solution composition.

CHAIRMAN STERLING: If there is no further discussion on this paper, we will give Mr. Mesle a hand.

REFERENCES

1 *F. C. Mesle* — Use of Potassium Carbonate in Silver Solution Quarterly Review — American Electro-Platers' Society 1914 Vol I, No. 3, Page 28.

2 *Dr. B. Egeberg* and *N. Promisel* — A study of Silver Plating Solutions Report of Nineteenth Annual Convention — American Electro-Platers' Society 1931, Page 116.

3 *Dr. B. Egeberg* — Improvement in Silver Plating Metal Finishing, June, 1936 8-6-329

4 *Frank Mason*, AMIEE
A New Maximum Current Density in Commercial Silver Plating Transactions of The Tardy Society. 1921, Vol. 16 Part 3.

5 *F. C. Mesle* — Factors of Importance in Silver Plating Monthly Review — American Electro-Platers' Society September, 1917 4-9-11.

6 *F. C. Mesle* — Methods of Silver Plating — Metal Industry March, 1929 — 27-3-129.

7 *F. C. Mesle* — Standard Quality for Plated Tableware Metal Industry N. Y. August, 1935 — 33-8-285.

8 *Hull & Strausser* — Journal of Research of The National Bureau of Standards — February, 1936 — 16-2-185.

9 *Blum & Brenner* — Journal of Research of The National Bureau of Standards — February, 1936 — 16-2-171.

Here and There

Bridgeport Branch held its annual outing on Saturday, September 25, at the Jockey Club. Owing to the threatening weather the attendance was smaller than usual; however, all who attended had a good time. Baseball, horseshoe pitching, as well as the usual indoor sports were enjoyed by the men, while the ladies were being entertained by less strenuous amusement. Representatives from Hartford, Springfield, Waterbury, New York, and New Haven Branches were present. Refreshments were served in the afternoon, after which the party wended their way homeward.

Keep in mind the Waterbury Branch annual meeting at the Hotel Elton, November 6th. Mr. Candee, the Branch Secretary, says "We hope to have a doctor present to tell about electroplating the inside of a person's nose to eliminate hayfever." This should make a very interesting talk for everybody.

Springfield Branch will hold its first annual Educational Session and Banquet on Saturday, November 20. Full details will be given in the November issue of the REVIEW.

Starting with this issue of the REVIEW, a page will be devoted each month to the work of the Research Committee so that every member of the A.E.S. will be informed as to what is being done. Each member of the Research Committee will write articles of interest to our readers. The meeting in Washington, October 6th, sounded the keynote of closer cooperation between the Committee and the A.E.S. members. Every Branch is being asked to help the Committee both morally and financially. If there is any doubt of the valuable work being done at the Bureau it is hoped that arrangements can be made to have some member of the Research Committee speak at the Branch meetings so that the complete story may be told. Each member of the Society should become more deeply interested in this branch of the work because after all it is our committee, and is not a separate organization. Know the truth about Research by getting first hand information from the members of the Committee.

Read President Wilson's article in this month's REVIEW on Research.

NEWARK BRANCH AMERICAN ELECTROPLATERS' SOCIETY

Program of Educational Meetings 1937 - 1938

October 1, 1937 Open Meeting

Dr. K. Schumpelt, Chief Electrochemist, Baker & Co., Newark, N. J. Subject: "A critical study of alloyed gold plating and their operation."

Nathaniel Hall, Chemical Engineer, Newark, N. J. Subject: "Pickling Practice."

October 15, 1937

Wm. F. Newberry, Detroit Rex Products Co., Detroit, Mich. Subject: "Solvent Degreasing."

November 5, 1937 Open Meeting

T. H. Chamberlain, Director of Research Laboratory, New Haven Clock Co., New Haven, Conn. Subject: Gold plating and the effect of heat treatment on heavy deposits."

Walter R. Meyer, Electrochemist, General Electric Co., Bridgeport, Conn. Subject: "Trouble Shooting in Electroplating."

November 19, 1937

G. Byron Hogaboom, Chemical Engineer, Newark, N. J. Subject: "Purification of Nickle Plating Solutions."

December 3, 1937 Open Meeting

Dr. C. L. Mantell, Chemical Engineer, Brooklyn, N. Y. Subject: "New Competitors for Electroplated Finishes."

Albert Hirsch, Electroplater and Chemist, Cary McFall Co., Philadelphia, Pa. Subject: "The effect of free Sodium Cyanide, Sodium Carbonate and Rochelle Salts on the Cathode Efficiency of a Cyanide Copper Solution."

December 17, 1937

Paul A. Oldam, Foreman Electroplater, E. Poeter & Co., Irvington, N. J. Subject: "Metallic Losses in Gold Plating."

January 7, 1938

George Reuter, Foreman Electroplater, American Can Co., Newark, N. J. Subject: "Nickle Plating on Steel."

January 21, 1938 Open Meeting

George B. Hogaboom, Technical Director, Hanson-Van Winkle-Munning Co. Matawan, N. J. Subject: "The pH of Alkaline Plating Solutions."

W. A. Wesley, Electrochemist, International Nickle Co., Bayonne, N. J. Subject: "Production and Uses of Heavy Nickle Deposits."

Lewis M. Graham, Electrical Engineer, Connecticut Dynamo and Motor Co., Irvington, N. J. Subject: "Control of Current at and in the Plating Bath."

February 4, 1938

Robert Sizelove, Chemical Engineer, Frederic Gumm Chemical Co., Kearny, N. J. Subject: "Rapid, Accurate Plating Solution Control."

February 18, 1938

Old Timers Dinner Party. Entertainment and Refreshments. Guest Speaker and Subject to be Announced.

March 4, 1938

Guest Speaker and Subject to be Announced.

March 18, 1938 Open Meeting

Dr. A. K. Graham, Chemical Engineer, Jenkintown, Penn. Subject: "Development in Alkaline Plating Baths."

Oliver J. Sizelove, Technical Director, Frederic Gumm Chemical Co., Kearny, N. J. Subject: "Question Box."

April 1, 1938

Paul A. Oldam, Foreman Electroplater, E. Poeter & Co., Irvington, N. J. Subject: "Carbonates in Gold Plating Solutions."

April 15, 1938 Open Meeting

Lionel Cinamon, Technical Director, Special Chemical Corp., New York, N. Y. Subject to be Announced.

G. Klinkenstein, Vice President, Maas & Waldstein Lacquer Co., Newark, N. J. Subject: "New Items of Interest in Metal Finishing."

Annual Banquet and Educational Session

Tentative Date April 23, 1938

Speakers: Albert Hirsch, Cary McFall Co., Philadelphia, Penn. N. E. Promisel, International Silver Co., Meriden, Conn.

Other Speakers and their Subjects to be Announced.

The Newark Branch of the American Electro-Platers' Society Meets first and third Friday of the month at the Kruegers Club, 13 Belmont Ave., at Springfield Ave., Newark, N. J.

Research News

With this issue and this page the REVIEW initiates a move which it is hoped will be of interest to all members. Hereafter, this page will be used exclusively for news of our research work and the committee in charge of it.

For some time it has been apparent that some of our members are not sufficiently well acquainted with the research work. In addition the Research Committee feels that it is possible that all of the members have not been completely "sold" on the value of the work being done. It is, therefore, hoped by means of this page to accomplish two things, first, to keep our membership informed concerning the research work and, second, to keep the research work constantly in the minds of our members.

As to the value of the research work there can be no question. You are all familiar with the past investigation of "spotting out". Although this work did not develop a sure cure for "Spotting out" it did show up at least some of its causes and it did indicate at least some of the things to be avoided if this is to be prevented. The more recently completed investigation of plating coatings on steel has produced definite results and results of definite value. The values of the various combinations and thicknesses of plated coatings have been so plainly indicated by this investigation that it appears almost certain that the standards so set up will be accepted as the standards for plating throughout the country. This may not seem to be of immediate value to the plater himself but it is. Several years ago with the advent of the stainless types of steel the plating industry especially certain branches of it faced a serious threat. If plating was to survive the quality must be improved but before this could be done it was necessary to know what good plating was. This information was obtained from the investigation cited above and today plating is successfully resisting the competition of stainless steel and of other finishes. It should also be remarked here that the only marked improvement of copper, nickel and chromium plating for outdoor exposure has been forced by the entrance of the stainless steels into the field. The research work now under way parallels that done on steel but the base metals being used are of various non-ferrous types. The value to the plating industry as a whole of this work is that the information so made available permits the successful competition of plated parts with parts of other materials and finishes. Practically it means money in the pocket of many a plater.

It may be that the present line of work is not of interest to some particular branch of the industry and that that branch would prefer work in some other direction. However, the work already started must be finished before other work of any great extent can be undertaken. When the present work is completed proposed new projects will be brought up before the society and a suitable one selected. In the meantime once the work of preparing the panels for the present test is finished the Research Committee will welcome suggestions for smaller investigations that can be run at the same time. For obvious reasons any such suggestions should be made by a branch rather than by individual members.

The three principal functions of the Research Committee have been, first, collection of funds, second, supervision of the work, third, disbursement of funds. The entire direction of the work has been conducted by this committee once the society as a whole has authorized the project for investigation. The committee is comprised of about fifteen members. It has done its work well but during the past few years the brunt of the work has fallen on one or two members. In an effort to relieve these men of some of this work and bearing in mind that so large a committee is unwieldly it was decided at the recent Washington meeting to have a sub-committee of five men including the present chairman who will keep in closer touch with the work than it is possible for the committee as a whole to do. This sub-committee will include both active and associate members.

In this article an attempt has been made to fully acquaint our membership with the general conditions surrounding our research work. More may be expected in future issues of the REVIEW.

A. B. WILSON, *President A. E. S.*

The 26th Annual Convention

Plans are well under way for the 1938 A.E.S. Convention to be held in

MILWAUKEE, WISCONSIN
June 13, 14, 15 and 16

Our aim is to make this convention one of the finest ever to be held. This can only be accomplished by a genuine endeavor on the part of each and every member to join in a spirit of whole hearted co-operation from all branches in assisting the General Chairman, R. M. Goodsell and the Convention Committees by preparing papers and exhibits and arranging for speakers.

Don't forget

"On to Milwaukee in '38,
Old acquaintance's hands to shake."

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Treasurer
Robert Steurnagel
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Educational
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Business and Social News

BRANCH NEWS

Educational Activities

AMERICAN ELECTRO-PLATERS' SOCIETY

CHICAGO BRANCH

The regular monthly meeting of Chicago branch was held September 11, 1937 at the Atlantic Hotel, President E. Stepka presiding and all other officers present.

The following applications were read and committees appointed on same: Mr. G. J. Yochim, Mr. C. L. Shaffer, Mr. E. J. Burke.

Mr. F. Baesler, Mr. L. Schmidt, and Mr. J. S. Edwards were reported to be on the sick list. Chicago branch officers and members extend their best wishes to these members and hope that they all will soon be back in normal health.

There were so many reports of the good time had by all those that attended the picnic on August 22, that a motion was made to hold a picnic again next year, and to have a committee appointed to secure a grove nearer Chicago.

The librarian, Mr. O. E. Servis found the following questions in the question box:

No. 1. How good is the Rochelle Salt solution for a cyanide copper solution?

Answer. It was the opinion of several members present that it was a very good type of solution. It gives a finer texture to the plate, but it is necessary to control the p. H. which should be from 9 to 11 using ¼ to ½ oz. free cyanide per gal, and about 7 oz. Rochelle Salt, using the solution warm from 90° to 115°.

No. 2. In a 1200 gal. tank of brass solution I want to reduce the cyanide content 1 oz. per gal. What is the best way to do this keeping in mind that all other contents are satisfactory?

Answer: Either by adding carb. of copper and zinc, or by diluting the solution.

No. 3. What effect do brighteners have on the corrosion resistance of barrel nickel plated work?

Answer. It was the opinion of the members present that when brighteners were used the plate would corrode more rapidly. One member stated that he had made several salt spray tests and found that the parts plated in the bright nickel solution failed sooner than the parts plated in the same solution without the brightener.

No. 4. How can small parts made from hot tin sheets be brightened?

Answer. Several suggestions were offered such as tumbling in water with soap, bark and steel balls, also dry tumbling with hard wood sawdust, one member stated he was having good results by tumbling parts in shredded newspaper.

J. W. HANLON, *Sec.*

BRIDGEPORT BRANCH

The regular September meeting of the Bridgeport Branch was held Friday, September 10, at the Chamber of Commerce Rooms, Stratfield Hotel with Joseph Sterling, president, presiding.

The roll call of officers was read and all members present including Joseph Sexton and Fred Norgrenn, both of the New Haven Branch.

The minutes of the last meeting were read and accepted.

Reports of committees:

George Wagstaff of the outing committee reported favorably on the outing to be held at the Jockey Club, Milford, Conn., on September 25, starting at 11 a. m. Refreshments will be plentiful. Door prizes will be awarded and prizes also for the sport contests.

Membership Committee:

Mr. Alfred Schneider and George Wagstaff have been appointed to succeed Mr. David Willard on the Membership Committee, the latter having removed to Detroit, Michigan.

Sick Committee:

Eugene Phillips reported that Mrs. Wm. Stratton is critically ill.

Communications:

The communication from Mr. Goodsell was read and also the list of speakers. These were turned over to the Librarian, Walter Meyer, who will call on these speakers later on.

The transfer of Fred Law, Jr. to Hartford Branch was read and accepted. The application of Clarence Charles Heliule was made and accepted.

Ballots for membership, none.

All bills for Branch were ordered paid.

Mr. Walter Meyer gave an outline of the Chemistry Class that will take place on Tuesday evenings starting September 28, at Warren Harding High School. Walter is looking forward to the formation of a large class and will be assisted by other members who are chemists in the Branch.

There will be a speaker at the October meeting. His name will be announced later. The business meeting will be held at 8 o'clock sharp, after which the address and discussion will be held. Other branch members are invited.

As there was no other business the meeting was adjourned.

WILLIAM H. FLAHERTY, *Sec.-Treas.*

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ROCHESTER BRANCH

The Rochester Branch held its regular monthly meeting on Friday night, September 17, 1937. Meeting called to order by President Kohlmeier. Minutes of previous meeting read and approved. Communications read and it was voted that this branch will cooperate as much as possible in forming a branch in Buffalo. The picnic committee then made its report and all bills ordered paid. During the ensuing discussions as to activities for this winter it was decided to hold the October meeting as a dinner meeting. This proposal met

with instant approval and Mr. John Honnecker was appointed to make arrangements. After a little more discussion the meeting was adjourned. The secretary was ordered to extend thanks for all the assistance given in making the joint outing with the Binghamton-Elmira Branch, such a great success.

JUDSON R. ELSTER, *Sec.*

DAYTON BRANCH

The first regular meeting of the year 1937-38 was held at the Engineers Club on Friday, September 3, with our President, Mr. Conley presiding.

Because of the rather long moving picture it was decided to leave any business until the last of the evening.

The picture shown was "The Manufacture and Use of Artificial Abrasives." This picture was furnished by the Carborundum Company and was very interesting and instructive and very much appreciated by the members and guests.

At this time Mr. Conley introduced Mr. E. W. Cochran of the N.C.R. Co. who talked on "Polishing as a Department."

Mr. Cochran thinks polishing is neglected as a department and that there is a need for better supervision and cooperation between the polishing and departments handling material prior to polishing.

Proper lighting, cleanliness and good ventilation are necessary to produce good work and good working conditions.

Mr. Cochran gave an interesting discussion of the handling and choosing of grains and different type wheels and their advantages and uses on various types of jobs.

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He also advised a close check on supplies and equipment and stressed the importance of the wheel room and the proper care and preparation of wheels. One of the most important things in the preparation of wheels being the preparation and care of the glue and proper drying of the wheels before using.

The fact was brought out that close cooperation between the polishing and departments handling the design and shape of new stock and the material to be used can do much to reduce the cost of polishing.

At the close of his talk Mr. Cochran was given a vote of thanks.

After the minutes of the previous meeting were read and approved, Mr. Conley complimented the members, especially Mr. Speakman, on the work exhibited at the convention and gave a short resumé of the convention program. Due to the late hour we adjourned until the first Friday in October.

CORLISS W. POWELL, *Sec.-Treas.*

NEWARK BRANCH

The regular meeting of the Newark Branch A.E.S. was held on Friday evening, September 17, 1937, at the Krue-

ger Club, Belmont and Springfield Avenues, Newark, N. J.

President George Klink called the meeting to order at 8:30 P. M. Other officers present were: William Hodecker, Vice-President; George Wagner, Secretary; Paul Oldam, Librarian; Roy Stout, Sargeant-at-arms; and Trustees, Samuel Taylor, Samuel Glickenhaus and Thomas Haddow.

A communication from Mr. R. M. Goodsell, 2nd Vice-President of the A.E.S., regarding speakers for educational meetings, was read and turned over to our Librarian.

A communication from Crowe Name Plate and Manufacturing Co. was read and the Secretary was instructed to answer same.

A bill from the Supreme Society for Per Capita Tax was presented and ordered to be paid.

An application for Mr. Harmon S. Hunt was voted to take the regular course.

Mr. Stephen S. Leshnick and Mr. James F. O'Brien were elected to Active Membership.

The resignation of Mr. Joseph Maurer was accepted with regrets.

Mr. George Reuter reported that arrangements were being made for the Educational Class and he stated that the classes would be held every Wednesday evening at the Laboratories of the Boy's Vocational School, Sussex Ave. and First Street, Newark, N. J. Class periods will be from seven to ten P. M.

Mr. Oldam was telling us about the speakers he had secured for our coming winter month meetings and upon motion duly made and seconded it was voted that the branch secure the services of a stenographer so that all papers and discussions can be recorded and printed for the benefit of the whole society.

As we had no speaker for the evening our Librarian called upon Mr. Dunroe for a talk on Bright Nickel, which proved to be quite interesting. Some of the things he mentioned were: that new Bright Nickel Baths should be electrolized for at least 15 hours at about 2 volts; that good cleaning was very essential for Bright Nickel Plating and that peeling was due mostly to imperfect cleaning. Mr. Philip Sievering asked the question, "What causes Japan to peel off castings that have been plated with Bright Nickel, the Japan

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being applied only to the recess parts that have not been buffed? Mr. Dunroe answered by saying that it was mostly due to the oxygen and hydrogen liberated by the heat in baking the Japan. Mr. Dunroe was given a round of applause for his talk by the thirty-four members present.

Meeting adjourned at 11:30 P. M.

GEORGE WAGNER, *Sec.*

LOS ANGELES BRANCH

Minutes of the Los Angeles Branch of the American Electro-Platers' Society regular monthly meeting held Wednesday, September 8th, at the Rosslyn Hotel. President John L. Marigold presided. Eighteen members were present. Minutes and financial reports of the previous meeting were read and accepted. Bills for $38.12 were read and ordered paid.

It was with deep regret that the death of Mr. Harry Marmer was read.

Mr. O. E. Hollinger sent in his resignation. It was suggested that the Secretary write him a letter of regret at his leaving the Society.

The Librarian found the following questions in the box:—

Q. What causes a cyanide copper solution to plate dark?

A. Insufficient cyanide.

Q. What other method will remove chrome from nickel plated surfaces besides Muriatic Acid?

A. Caustic soda and water, using reverse current.

Q. In a warm nickel solution temp. 125 *deg. F. p.H.* 5.6 *the work having a smooth gray deposit excepting for tiny bright spots. What causes this?*

A. Impurities in solution, filter, bag the anodes, check chloride. Use sodium carbonates to raise pH.

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The meeting adjourned at eleven P.M.

RAYMOND SOLIVAN, *Sec.-Treas.*

MILWAUKEE BRANCH

The Milwaukee Branch A.E.S. held a business meeting, September 16, 1937, at Lipps Hall and only a small group of business-minded men were present; showing that we are really an educational society and happy to know it. This meeting was called so as not to interfere with the regular meeting held on September 9, 1937, at which time it was all educational with a good turnout of members.

Minutes of the last meeting read and approved; all bills allowed. Mr. Henry Bornitzke, our Librarian, was given a list of available speakers for the winter, and he should have little trouble keeping us well supplied with able and worthwhile men for the coming active season. This being practically the first meeting to start off for the coming 1938 Convention $200 was turned over to the convention treasurer, Robert Steuernagle.

Milwaukee branch has some very active members as there were five new members up for membership, one rein-

statement. Here they are: Oscar B. Moe, associate; Emil Gralski, Active; Irving M. Herrmann, Active; Walter F. Geil, Associate and Clayton Taft, Active. Fred W. Hau, Active, reinstatement.

The members of the Milwaukee Branch feel quite sure that the present winter season is going to be very productive for everyone, that is, for all those who will attend meetings, and contribute to the general discussions for which we are well known. After all no one can get more out of an educational society than they put into it. Exchanging dollars helps no one, exchanging ideas helps both.

A. J. HERMANSEN, *Sec.-Treas.*

PHILADELPHIA BRANCH

The Philadelphia Branch of the American Electro-Platers' Society met in Reading, Friday, September 17, 1937 at the Union Fire Company's Hall with an attendance of 85, which shows what can be done with a little effort and such effort should be expended throughout the balance of the year to secure even better attendance.

Moved and seconded to dispense with regular order of business after the reading of the applications and turn the meeting to the Reading Meeting Chairman carried.

The following applications were then read: Mr. Raymond C. Eckeit, active; Mr. Theodore D. Gaul, Active; Mr. Frank H. Weover, active; Mr. H. P. Jacque, associate; Mr. Harold Scott Pelham, associate; Mr. James Hamilton Robins, associate; Mr. John Stedman Dinone, associate; Mr. D. Woodward Pritchard, associate.

Moved and seconded that all applications be referred to the Board of Managers, carried.

Mr. Dwight Overcash from the Brown-Lipe-Chapin Division of General Motors in Syracuse, New York, gave a very instructive talk upon bright nickel plating which was so interesting that the question period equaled in time the length of the address and had to be cut short, since our speaker was obliged to make train connections.

The secretary will be glad to collect any further questions and receive answers by mail from Mr. Overcash.

Our next meeting on Friday, October 15, at the Harrison Laboratory, University of Pennsylvania, N. W. corner of 34th and Spruce Streets, should be equally well attended since Mr. Vincent Daviss of the duPont Company

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will give a lecture with colored lantern slides, showing the effects of corrosion on the exposure test samples in a way which visual or black and white photographic inspection could never do. Those who have seen a part of this exhibit before are very enthusiastic so let us have a good turnout of members as well as of all our old and new friends, whether members of the American Electro-Platers' Society or not.

Regarding the annual meeting and banquet to be held at Adams, 13th and Spring Garden Streets on the Saturday before Thanksgiving, November 20, 1937, in order to make this affair a big success why not have every member pledge himself to contribute one advertisement to the program from some organization selling his firm and also guarantee to contribute one door prize either of his own manufacture or to solicit one from a supplier of his firm. There are many sources of supply unique to each individual firm unknown to the general trade and these are the ones who should be solicited.

The committee guarantees the best time ever with an internationally known orchestra for dancing starting promptly at nine thirty P. M., music and entertainment during the banquet, 100% American favors and door prizes which latter will be run off by a more rapid method this year to allow plenty of time for dancing. Also, the large downstairs hall will be available for the afternoon meeting which will eliminate the noise and smoke nuisance of the Gray Room.

Refreshment checks will be sold by the committee at bargain prices and the proceeds given to the branch, so it is hoped everyone will refresh himself and his friends plentifully.

Several changes in address have been noted, and any others should be sent to the secretary or editor as well as the names of those members who may desire to receive the reminder.

Let us all resolve to bring to every meeting at least one prospective member or some individual interested in our work, through whom the value of our organization may be broadcast and don't forget to boost Dr. Blum's research meeting at Temple University the evening of December 9.

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HARTFORD BRANCH

The Hartford Branch of the A.E.S held its first fall meeting on Monday evening, Sept. 20, 1937, at the Elk's Club, Bristol, Conn.

The meeting was called to order at 8.30 with Pres. Pietro in the Chair. Minutes of the previous meeting were read and accepted. All communications were read and placed on file. One bill for our first quarter Per Capita Tax and Convention Proceeding Copy were voted paid.

Mr. A. N. Austin, Chairman of the Outing Committee made a report on same, as well as a report on a special meeting held.

Under new business, six new applicants were elected to associate membership, as well as one gained by transfer, Mr. Fred Lau, Jr. of the Bridgeport Branch.

A ways and means committee was appointed to assist the Librarian in making the meeting this year more interesting.

The meeting was attended by fifteen members and was adjourned at 11.15 P. M.

V. E. GRANT, *Sec.*

BINGHAMTON-ELMIRA BRANCH

The first meeting for this year was held Friday evening, Sept. 24, at the Y.M.C.A. in Binghamton. The meeting as usual started with a dinner at 6.30. Between 50 and 60 members and friends attended. We were especially honored by having Past President Frank Mesle of Oneida Ltd. attend. We hope to see more of him. Mr. Wesley L. Cassell, 30 E. 42nd St., New York City was elected to associate membership.

Our President, Larry Meyer gave a brief talk on the attendance at the meeting. While we had a pretty fair showing, he is still not satisfied that everyone who should attend has been there. Binghamton Branch as you know always has an open meeting.

Mr. Mesle was asked for a few remarks and as usual he was running true to form. He said, "He came down to hear the speaker of the evening and as he thought that was why the rest of us were there we certainly did not want to hear him."

The speaker of the evening was Walter R. Meyer of General Electric, Bridgeport with a projectoscope demonstration of a nickel and cleaning solution, also about forty slides showing the structure of plated coatings. Walter spoke on cleaners, nickel, copper and brass, his trip to Europe, his experience in the laboratory and in the shop. In fact there wasn't any part of the plating field that wasn't touched upon. Mr. Meyer went over big in Binghamton. We hope we are able to have the pleasure of hearing him again.

The next meeting will be held about the middle of October. Notice by card.

A. L. FLETCHER, *Sec.*

DETROIT BRANCH

Minutes of meeting of Detroit Branch of the American Electro-Platers' Society held at the Hotel Statler, Friday Evening, September 10, 1937, with all the officers present.

The reading of the minutes for the June meeting was dispensed with and we started right in on the program for the evening.

Applications for new membership: Joseph Angaran, Active, 4409 Vermont Ave., Detroit, Michigan; Donald A. Gaines, Associate, 1936 W. Lafayette Blvd., Detroit, Michigan; Donald A. Gifford, Associate, c/o A. T. Wagner Co., 2700 Wight St., Detroit, Michigan; Walter L. Higgs, Active, King Seeley Corp., Ann Arbor, Michigan; Ralph P. Roetter, Active, Dresden Hotel, Flint, Michigan; John F. Siefen,

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Then followed a report from Mr. George L. Nankervis on the picnic. He reported it a great success.

The delegates then made reports on the Convention which was held in New York in June. Your secretary gave a report on the business transactions. Mr. H. M. Cherry gave a very comprehensive report on the exhibits stating that there were more and better exhibits of plating work than at any previous Convention held and Detroit Branch had the best exhibit and carried away the gold cup.

President, Mr. A. B. Wilson, gave a report on the entertainment of the Convention which was very complete and the entertainment furnished the Convention by the New York Branch was excellent.

Mr. James Higgins then reported on all the papers which were read at the educational sessions and it was quite a report. It was well gotten up and well read. Mr. Higgins put a lot of work into this report and gave us the benefits of same.

It was decided that we have another buffet supper and dance sometime during the winter. Mr. George L. Nankervis, Mr. H. M. Cherry, Mr. Charles Beaubien were appointed the Committee on this with Mr. Nankervis as Chairman. We are looking forward to what this Committee will do and we are confident that they will furnish us with an excellent evening. It has not been fully decided whether we will have an educational session or not.

There were a few questions in the Question Box which Mr. B. F. Lewis handled. I do not have them for this publication but I probably will have them for the next.

T. C. EICHSTAEDT, *Sec.-Treas.*

DAYTON BRANCH

The October meeting of the Dayton Branch was held at the Engineers Club on Friday, October 1st.

After a short business session at which a list of delinquent members was turned over to the Board of Managers for action, our President Mr. Conley introduced the speaker for the evening, Mr. Mattacotti of the Hanson-Van Winkle-Munning Company. Mr. Mattacotti gave a talk on "Bright Cobalt Nickel Plating." He gave several advantages of Cobalt Nickel over Nickel alone, such as greater ductility and increased corrosion resistance.

The data given on the operation of a cobalt nickel bath was unusually complete, including concentration of chemical constituents, current density, temperature range, agitation and filtration control.

Mr. Mattacottis' talk brought forth the most lively and interesting discussion that has been heard at the Dayton Branch for a long time.

At the conclusion of his talk Mr. Mattacotti was given a vote of thanks.

It was decided at this meeting to move our November meeting ahead about two weeks if it could be arranged for Dr. Blum to stop over and speak to the Dayton Branch on his way from St. Louis.

At this time it was moved to adjourn.

CORLISS W. POWELL, *Sec.*

PROVIDENCE-ATTLEBORO BRANCH

The meeting of the Providence-Attleboro Branch was held at the Narragansett Hotel Friday, September 17, 1937. The President, Mr. Chace, could not attend.

Mr. Romanoff, a chemist and a member of Chicago Branch was present

and together with Dr. Strachan, Donald Wood, and Mr. Rinker, carried on a very interesting discussion relative to Silver-Plating.

This being the first meeting of the fall term, the question of securing speakers was discussed and, Mr. Rinker promised to get in touch with Mr. Schimpf, chief chemist for Baker & Co., and ask him to talk on Gold-Plating.

It was also agreed that we should secure other speakers, if possible, to talk on subjects of interest to this Branch.

Mr. Mark Weisberg has promised to speak at the next meeting.

The application of Mr. A. Samuel Courcy for active membership was received.

JOHN ANDREWS, *Sec.*

BOSTON BRANCH

Boston Branch met for the first time since last June, Thursday, the 7th, at the Manger hotel Boston, with Vice-Pres., DeLorme in the chair, our Pres. Mintie being sick and getting along fine now.

The regular order of business was dispensed with so that the speaker of the evening could have all the time necessary, after that business will be taken up.

The librarian, Bert Sage introduced George Hogaboom, his talk was "The pH of Alkaline Solutions." He said that he was a greater believer of the pH value of alkaline solutions and explained and showed on the screen how the pH of the following solutions are taken: Cyanide copper, Cadmium, Silver and Brass.

He showed on the screen the different ranges of the solutions after they had been tested and the pH taken and that the brass solution was the most interesting to him as he said that the brass solution could be changed by the pH to give a very beautiful yellow plate without adding any more metal. He also showed that when the anodes in a copper solution turn green that it is not always from lack of cyanide but that the pH is not right. He spoke for more than two hours and answered all questions for the members and we had one of the largest meetings in a long time so that he had plenty to answer.

A rising vote of thanks was given Mr. Hogaboom for his very interesting talk.

The meeting was then turned back to the Vice-Pres. A motion was made that the branch buy a lantern for future use at our meetings.

An invitation was extended to Boston branch by Frank Clark of Springfield branch to attend their first banquet on Nov. 20th and some of the members will try and be there.

Bert Sage made a report on the convention but will have a written report for the next meeting. The delegates had a great time in New York.

The Branch voted to hold its annual Banquet the last Saturday in Feb. next year and the following were appointed to make all arrangements: Joe Barron chairman, George DeLorme, Bert W. Sage, Arthur Collins, Al. Baker, Charles Hardy, A. W. Garrett, and Edward DeLorme.

A report was made on the picnic and every one that attended had a great time.

Boston branch will hold two meetings a month, one for our speakers and the other for regular business.

The banquet will be held at the Bradford Hotel with a technical session in the afternoon and banquet in the evening with a better floor show than we had last year. Everybody is

welcome, and the ladies will be taken care of as they were at the last banquet.

Three applications were read for the first time and turned over to the board of managers as follows: John E. Aylward, 1; Church Street, North Walpole, N. H. Associate; Charles H. Becker, 192 Highland St., Roxbury, Mass., Associate; and Charles W. Lowell, 56 Boston St., Somerville, Mass., Associate.

Suspended the following members: Francis J. Brennan, 24 Warwick Rd., Watertown, Mass., J. Arthur Zimmer, 149 W. Sixth St., So. Boston, Mass; Ernest C. Andrews, 148 Wordworth St., E. Boston, Mass.; James J. Reagan 213 Princeton St., E. Boston, Mass.; and Charles A. Sleicher, 43 Oak Ave., Larchmont, N. Y.

The meeting adjourned at 11 P. M.

A. W. GARRETT, *Secy.*

WATERBURY BRANCH

Minutes of Meeting Friday, October 8th, 1937

Thirty-two members were present to hear a short talk and question box conducted by Mr. Oliver Sizelove.

A considerable discussion was held on copper plating, lead plating and spotting out. The discussion continued until well after ten oclock.

Announcement was made by the banquet committee that the banquet would be held Saturday, November 6th. There will be a technical session in the afternoon and a banquet at 7:30 with entertainment and dancing. All members and friends of the A.E.S. are invited.

E. T. CANDEE, *Sec.-Treas.*

BRIDGEPORT BRANCH

The regular Meeting of the Bridgeport Branch was held at the Stratfield Hotel in the Chamber of Commerce Rooms on October 1. Joe Sterling, President called the meeting to order, there were twenty members present. The regular business meeting was very short due to the fact that an open meeting was being held at 8.30.

The roll call of officers was read.

The minutes of the last meeting were read and accepted.

The Chairman of the Outing Committee reported that on Sept. 25 a most sucessful Outing was held in Milford. Two compacts donated by the local branch were won by Mrs. Geo. Karl. and Mrs. Louise Fallon as door prizes. and other winners were Bill Bridgett who won a hand drill, a gift of The Zialite Corp., Mr. Stevens, Mr. Harry McFadden and Mr. John English, who won a cigarette case, a gift from Mr. Frederick Norgren, a flash light donated by the Bridgeport Metal Goods and a steering wheel control given by the Casco Products Corp.

Ten Ladies entered the Dart games, the most sucessful contestants were Mrs. Kenneth Kusterer, Mrs. Ben Kusterer and Mrs. Pauline Sterling who received compacts donated by the local branch. Of six teams entered in the Egg Throwing Contest, George Wagstaff and Ed. Charleson won the game.

A communciation from the Waterbury branch on the Banquet and Technical Session to be held on November 6 was read and ordered placed on file.

All bills against the Branch were ordered paid.

The Treas. Report was read and accepted.

A motion was made to adjourn that members and guests might attend the Open Meeting which was held in the South Room of the Hotel.

WILLIAM H. FLAHERTY, *Sec.*

SPRINGFIELD BRANCH

The regular monthly meeting of the Springfield Branch A.E.S. was held Monday evening, September 27, 1937, at the Indian Social Club, with President Barrus in the chair.

The minutes of the previous meeting were read and approved.

The preliminary report of the banquet committee was brought in by Mr. Frank Clark. He reported that the Highland Hotel could be secured either Saturday, November 13, 1937, or Saturday, November 20, 1937. He also read several menus at different prices. After some discussion, Mr. Prouty made a motion, which was carried, that the banquet be held November 20, 1937. Mr. Niles made a motion that the price would not exceed $2.00 per person. This motion was carried also.

Members voted to pay bill for Per Capita Tax and convention proceedings.

The applications of two prospective members were read and the usual course taken. The applications were as follows:

Mr. Bernard Caplan, Samuel Jones & Co., London, Eng., Active member.

Mr. Joseph A. Morin, Worthington Pump & Machine Corp., Holyoke, Mass., Active member.

Mr. Heartshorn gave a brief report of some of the proceedings at the New York convention.

Mr. W.J.R. Kennedy, the Executive Secretary, complimented the Branch for its fine representation at the convention. The International Casket Hardware Company was also complimented for their splendid exhibit. He told the members that at the Milwaukee convention next year, the trend would be toward plant visitations, as there were many interesting plants in the vicinity of the convention city.

The speaker for the evening was Mr. D. Heartshorn, of the Westinghouse Electric & Mfg. Company.

His subject was, "Copper plating from Cyanide Solutions." He submitted graphs, showing operating conditions with different pH values. He, also exhibited samples plated in these baths. At the conclusion, he answered questions asked by various members. He was given a rising vote of thanks.

The meeting adjourned at 10:45 P.M.

HENRY R. DELARM, *Sec.*

ANNOUNCING

FIRST ANNUAL

EDUCATIONAL SESSION AND BANQUET

DETROIT BRANCH

Saturday, December 4, 1937 Keep This Date Open

OUTSTANDING SPEAKERS: Blum, Hogaboom, Baker and Oplinger

Membership Report

To September 1, 1937

ELECTIONS

Clarence C. Helmle, 44 Autumn St., Bridgeport, Conn.
Associate, Bridgeport Branch

Stephen S. Leshnick, 3073 Buhre Ave., Bronx, N. Y.
Active, Newark Branch

James F. O'Brien, 216 E. 75th St., New York City.
Active, Newark Branch

Frank P. Ciandella, 73 Prospect St., New Britain, Conn.
Associate, Hartford Branch

John Campisano, 250 West St., Bristol, Conn.
Associate, Hartford Branch

John J. Bedus, 18 Burnham St., Terryville, Conn.
Associate, Hartford Branch

Joseph L. Cormier, 58 Laurel St., Bristol Conn.
Associate, Hartford Branch

Oscar Crochetiere, 87 Locust St., Bristol, Conn.
Associate, Hartford Branch

John C. Goddard, 3rd., Box 863, Cheshire, Conn.
Associate, Hartford Branch

Wesley L. Cassell, 30 E. 42 St., Room 618, New York City.
Associate, Binghamton-Elmira Branch

Harry Harding, c/o Crane Co., 3800 St. Patrick St., Montreal, Canada.
Active, Montreal Branch

Edwin C. Rinker, 330 Benefit St., Providence, R. I.
Associate, Providence-Attleboro Branch

Joseph A. Smith, 15 Watanga Ave., No. Providence, R. I.
Associate, Providence-Attleboro Branch

APPLICATIONS

G. J. Yochim, 1910 Maypole Ave., Chicago, Ill.
Associate, Chicago Branch

C. L. Schaffer, 1710 Frances Ave., Elkhart, Ind.
Associate, Chicago Branch

E. J. Burke, 2145 N. California Ave., Chicago, Ill.
Active, Chicago Branch

Oscar Bernhard Moe, 716 N. 11th St., Milwaukee, Wis.
Associate, Milwaukee Branch

A. Samuel Courcy, 398 So. Main St., Attleboro, Mass.
Active, Providence-Attleboro Branch

Hermon S. Hunt, S. S. White Dental Mfg. Co., Princes Bay, L. I., N. Y.
Associate, Newark Branch

Joseph Angaran, 4409 Vermont Ave., Detroit, Mich.
Active, Detroit Branch

Donald A. Gaines, 1936 W. Lafayette Blvd., Detroit, Mich.
Associate, Detroit Branch

Donald A. Gifford, c/o A. T. Wagner Co., 2700 Wight St., Detroit, Mich. Associate, Detroit Branch

Walter L. Higgs, King Seeley Corp., Ann Arbor, Mich.
Active, Detroit Branch

Ralph P. Roetter, Dresden Hotel, Flint, Michigan.
Active, Detroit Branch

John F. Siefen, 1936 W. Lafayette Blvd., Detroit, Mich.
Associate, Detroit Branch

Raymond C. Eckeit, Active, Philadelphia Branch
Theodore D. Gaul, Active, Philadelphia Branch
Frank H. Weover, Active, Philadelphia Branch
H. P. Jacque, Associate, Philadelphia Branch
Harold Scott Pelham, Associate, Philadelphia Branch
James Hamilton Robins, Associate, Philadelphia Branch
John Stedman Dinone, Associate, Philadelphia Branch
D. Woodward Pritchard, Associate, Philadelphia Branch

Emil Gralski, 516 W. Highland Ave., Milwaukee, Wis.
Active, Milwaukee Branch

Irving M. Herrmann, 906 E. Bay St., Milwaukee, Wis.
Active, Milwaukee Branch

Walter F. Geil, 644 So. 5th St., Milwaukee, Wis.
Associate, Milwaukee Branch

Clayton Taft, 626 So. 5th St., Milwaukee, Wis.
Active, Milwaukee Branch

Joseph A. Morin, 50 Beverley St., Willimansett, Mass.
Active, Springfield Branch

Bernard Caplan, 5 Coniston Road, Bromley, Kens., England.
Active, Springfield Branch

John E. Aylward, 10 Church St., No. Walpole, N. H.
Associate, Boston Branch

Chas. H. Becker, 192 Highland St. Roxbury, Mass.
Associate, Boston Branch

Chas. W. Lowell, 56 Boston St., Somerville, Mass.
Associate, Boston Branch

RESIGNATIONS

Joseph Maurer, Newark, N. J. Newark Branch

O. E. Hollinger, 825 S. Euclid Ave., Ontario, Calif.
Los Angeles Branch

The Abstract Section

R. M. GOODSELL, *Chairman, Program and Educational Committee*

Black Deposits of Lead Dioxide (Schwarze Bleisuperoxydniederschlëge) *Die Metallwaren-Industrie und Galvano-Technik* Vol. **35,** 1937, pages 156-157—Anodic lead dioxide coatings from alkaline lead oxide solutions are smooth, coherent, black, and on iron and copper give good protection against atmospheric corrosion. The coatings are suitable for many objects such as radio parts, tools, guns, machine parts etc. The most suitable bath and operating conditions are as follows:

Caustic soda 120 grams/liter (16 oz./gal.)
Lead oxide (Pb°) 40 grams/liter (5.4 oz./gal.)
Temperature 40°-50° C (104° - 122° F)
Current density up to 3 amps./ft²

A current density of 1 amp./ft² will deposit .0002″ of lead dioxide in an hour with a specific gravity of 9. A slight excess of lead oxide is added to keep the solution saturated with lead. The work to be coated is made the anode and the cathode may be made of iron, lead, or nickel hung in a porous cell to minimize the deposition of lead. Steel or nickel articles can be covered with a uniform, black deposit .0003″ thick by employing a current density of 3 amps./ft² for 30 minutes. Lower current densities and correspondingly longer plating times may be also used successfully.

Copper surfaces may give trouble at first because the copper is attacked anodically in caustic solutions but this difficulty can be overcome by first striking the copper with a current density of 20 amps./ft² for several seconds until a dark passifying film forms and then the current may be lowered to the usual value. Movement of the article in the solution during plating is helpful in securing a uniform deposit upon irregularly shaped objects. This procedure is particularly necessary for depositing coatings upon brass, lead, or cadmium basis metals. Sandblasted steel is covered uniformly at the usual temperatures but if the temperature is raised above 120° F, many large uncoated spots will remain on the surface of the steel.

The throwing power of the solution is excellent and objects with projections and recesses are covered as uniformly as flat sheets. With strongly increased current densities, the deposits become dull, sooty, and finally the work becomes streaky and covered with a brown pulverent deposit. The allowable current densities increase with temperature as follows: 70° F, 1 amp./ft.²; 105° F, 3 amps./ft.²; 120° F, 8 amps./ft²; 212° F, 15 amps/ft². The higher temperatures are not as satisfactory as the lower temperatures because the deposits become increasingly brittle with a rise in temperature.

With lower lead contents than has been recommended, the maximum employable current density decreases. The maximum solubility of lead in 120 grams per liter of caustic soda is 36 grams per liter if lead monoxide is used and is lower if red lead is used. A sodium carbonate content of 50 grams per liter (6.7 oz./ gal.) has no harmful effect upon the quality of the deposit. A thorough

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study of organic addition agents has been made and no substances have been found which are of benefit. The abrasion resistance of the lead dioxide coatings increases with increasing thickness and a coating .0006" thick will have the same resistance to abrasion as the coatings produced in the browning process commonly used on firearms. The adhesion of the dioxide coatings to cold rolled steel and polished copper is poor, is better on sand blasted steel and rolled copper, and is still better on unbuffed electro-deposits of copper, nickel, or cadmium.

With dry, indoor atmospheres, the deposits remain unchanged for years but if they are handled, white spots will form. A light oiling with mineral oil will cure this difficulty. Dioxide coatings .0003" thick on copper will withstand outdoor industrial atmosphere for six months with only the formation of a thin grey film which can be easily removed by a light burnishing.

Lead dioxide decomposes at 554° F and hence the deposits can only be used on objects where the temperature remains below 540° F.

WALTER R. MEYER

METAL AND ALLOY ABSTRACTS

Lapless Gauges. H. J. WILLIS, *Am. Machinist*, Vol. **81,** Mar. 24, 1937, p. 247—A new commercial process of finish grinding is described by which the gauges or pieces to be finished to dimension, are built up by chrome plating and then ground in a single process on a recently developed aloxite resinoid wheel, thus eliminating a series of wheels of progressively increasing fineness.

P. J. RITZENTHALER

Sharpening Wheels. V. H. ERICSON, *Am. Machinist*, Vol. **80,** Dec. 2, 1936, pp. 988-990—The selection of wheels for grinding a given material is discussed and the abrasive, grain size and bond for various kinds of operations are tabulated.

P. J. RITZENTHALER

METAL CLEANING AND FINISHING

Testing and Stripping of Electrodeposits (Copper and Copper Alloys). By DR. B. EGEBERG and N. E. PROMISEL. Part IV (Conclusion)—Copper is cathodic to most base metals on which it is deposited. For adequate protection, porosity should be at a minimum. Since pinholes usually decrease in number with increased thickness of plate, it is evident that localized tests for thickness are important. Microscopic measurements, while accurate, are lengthy. Maeder's drop test is described. 1:1 nitric acid is used. 45 to 50 seconds corresponds to a thickness of 0.0005 in. Solutions and methods used in Clarke's jet test are fully described. Adhesion of deposits may be tested by bending, twisting, burnishing, deep drawing, chiseling, etc. Although these tests are in no sense quantitative they may be interpreted fairly well as to comparative adhesion. Authors comment that a machine for testing hardness of electrodeposits would be extremely useful. Readers are referred to earlier article of series for wear resistance tests. The saltspray, ferricyanide, hot water tests, etc., are applicable for determining porosity in copper deposits on a ferrous base. With zinc and

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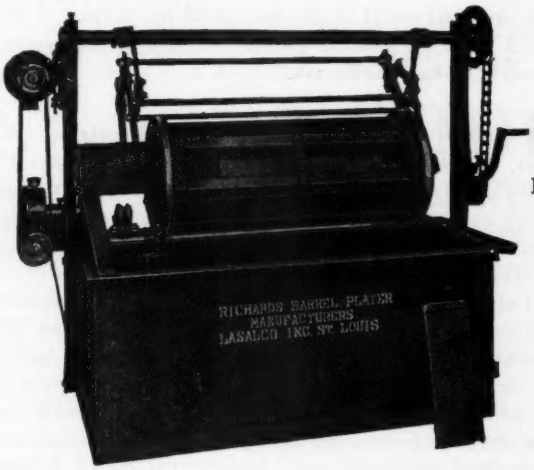

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aluminum bases porosity tests are based on gas liberation when the solution used attacks the basis metal at the bottom of the pores. A recommended solution is 2.5 per cent. galatine solution containing 2.5 per cent. sodium hydroxide used at room temperature. E. T. SHEEHAN.

Purifying Nickel Plating Solutions by Electrolysis. DR. LOUIS WEISBERG. *Metal Industry*, Vol. **39,** September, 1937, pp. 451-453—An economical method is described in full for cleaning nickel solutions of common impurities such as copper, zinc, iron and lead, by considering electromotive series the higher a metal stands in this series, the greater potential must be applied to make it deposit. Raising temperature and agitation are helpful. This method eliminates filtration and requires no special equipment. The loss of nickel by electrolysis not more than 1/2 to 1 pound per 100 gallons of solution purified. Solution contaminated with copper or lead electrolysis with current density of 2 amperes per sq. ft. until total current amounts to 2 ampere hours for each gallon treated. This method is sometimes used for removing the brightner from some types of bright nickel solutions to convert them into dull nickel solutions. ROBERT B. GOODSELL.

The Passivity of Metals and its Application to Electroplating. J. LIGER, D.D.Sc. *Metal Cleaning and Finishing*, Vol. **9,** No. 8, August 1937, pp. 681-686—Oxides that are visible only with a microscope which are caused by polishing and buffing exists on polished steel. This oxide causes mechanical passivity which interferes in the adherence of the plate unless steps are taken to eliminate them. The same applies to copper and its alloys, only the oxide is more porous and less hard than the oxide of iron. More care in last "passes" and final brushing with tampico brush help to eliminate this oxide. Alkaline degreasing solutions such as a combination of caustic soda and soda ash forms passiveness. Acid dips are recommended to destroy these films; sodium cyanide in alkaline degreasing solutions are beneficial for decomposing oxides. ROBERT B. GOODSELL.

Metal Spraying: Processes and Some Characteristics of the Deposits. By E. C. ROLLASON, M.Sc.—Spraying pistols employing wire metal are all basically similar. Compressed coal gas or acetylene and oxygen supply the flame. The molten metal is atomized by compressed air. Molten metal pistols are gravity-fed. The metal supply is pre-melted in a furnace, then transferred to the pistol's container. Temperature is maintained by a small bunsen burner. A third type of pistol employs powdered metal. The powder is sucked through an oxygen-gas flame, and blown onto the work. Electrically heated pistols have not attained commercial importance. Work to be metal sprayed must be thoroughly clean. Steel grit or sand blasting of the surface is essential to key the deposit. Article presents numerous photomicrographs of various type deposits, and author's theory of metallizing. Corrosion tests are being conducted. E. T. SHEEHAN.

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September 23, 1937

The Editor, THE MONTHLY REVIEW
90 Maynard Street
Springfield, Massachusetts
Dear Sir:

On page 682 in the abstract section of the September MONTHLY REVIEW a German article on the formation of patina on copper is abstracted.

This abstract refers to a process for patina formation described by Mr. J.R. Freeman, Jr. and myself (Metals and Alloys; 1932 Page 190-195) and infers that the control of the ammonia content of the bath that we used is a difficult problem. Actually, as was pointed out in the original article, the process is almost completely self-controlling and requires only infrequent additions to maintain its pH. This involves nothing more than the customary replacement of the ingredients of a bath as they are consumed.

Very truly yours,
PHILIP H. KIRBY

PRESIDENT OF PHILADELPHIA BRANCH ANSWERS MR. SAGE

September 26, 1937

Mr. Wm. J. R. Kennedy
90 Maynard St.
Springfield, Mass.

Dear Bill:

It was with considerable interest that I read your editorial, and also Mr. Sage's letter on the Boston Amendment. What I cannot understand is this, just who does Boston want as members of the A.E.S.?

We now allow Foremen, Assistant Foremen, and Supply Men who can qualify to join our organization, and also last but not least the chemist, now just who else is there left?

Is it the factory superintendent?

Well most of them that I know are satisfied to leave their plating problems to their chemist and foreman plater.

Is it the supply man?

Well to look at the attendance at the convention that branch of the industry is pretty well represented.

Next we have the student. Now just what good to the A.E.S. would he be? Of course we would collect his six dollars every year, but I feel and these are my personal views, and mine alone, that we are not that badly in need of money to admit every one that wants to find out the mysteries of plating if there are any left, as members of the Platers Society.

The A.E.S. was founded to spread the knowledge of electro-plating among the foremen platers, since that time we have opened our ranks wide, and now cover the whole field.

Now lets take a look at the financial side of the picture. We have been able to finance our research work during the greatest depression the country has ever known, a year ago appointed a full time secretary; while the Branches having the convention on the past few years have reaped a financial harvest.

Supposing that money is the answer to the question. I believe that the Supreme Society should take over the national convention so that all the branches would benefit. Then there would be no need of throwing our doors open to everyone.

Well Bill, I guess I have said enough for one time, so just keep up the good work with the REVIEW, and hoping to have the pleasure of greeting you at our annual meeting in November, and with best personal wishes, I remain

Very truly yours,
JOE UNDERWOOD

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Boston Branch

PROGRAM OF REGULAR MEETINGS

Date	*Subject*	*Speaker*
October 7, 1937	pH of Alkaline Solutions	George Hogaboom
October 21	Olde Timers Night	
November 4	Trouble Shooting in Electro Plating	Walter Meyer
November 18	Assistant Foreman Speaks	
December 2	Bright Copper	Dr. Ernest Wilson
December 16	The Xmas Spirit	
January 6, 1938	To Be Announced	O. J. Sizelove
January 20	Discussion on Foremanship	
February 3	To Be Announced	C. Barber
February 17	Plating Room Layout	
March 3	To Be Announced	
March 17	Cadmium and Zinc	
April 7	New Items of Interest in Metal Finishing	Dr. Klinkenstein
April 21	To Be Announced	Don Wood
May 5	Activated Carbons in Industry	W. A. Helbig
May 19	Election of Officers	
June 2	Instruction of Delegates to Convention	

The Boston Branch Meets Twice a Month — First and Third Thursdays
Hotel Manger at 8 p. m.

THE G. S. BLAKESLEE & CO. are pleased to make the following announcement in regard to their new plant addition:

G. S. Blakeslee & Co., manufacturers of degreasing machines and metal parts washers, announce ground has been broken and construction started on a two story addition to their present plant at 19th Street and 52nd Avenue, Cicero, Illinois.

This addition will give a 50% increase in their present manufacturing floor space, as well as doubling their present office space. This addition is the result of increased demand for Blakeslee degreasing equipment and Blacosolv, the degreasing solvent used in these machines.

In the last several years, the popularity of this process has regularly increased due to the perfect cleaning jobs rendered on metal parts prior to plating, painting, enameling, inspection, and assembly in all the branches of industrial metal finishing and fabrication.

OMISSION

In the September Issue of the MONTHLY REVIEW, we published the names of the 1937-38 Research Committee, but inadvertently overlooked the name of Mr. W. M. Phillips.

In a previous issue of the REVIEW however, we mentioned that Mr. Phillips was appointed by President Wilson as Chairman of the Research Committee which position he has held for several years.

Our apologies to Mr. Phillips for the omission.

SPRINGFIELD BRANCH WILL HOLD ITS

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NATIONAL BUREAU OF STANDARDS, WASHINGTON, D. C.
September 13, 1937

Notice

Conference on Supplemental Exposure Tests of Plating, Principally on Non-Ferrous Metals.

Chemistry Building, National Bureau of Standards, Washington, D. C.
Wednesday, October 6, 9:00 A.M.

The American Electro-Platers' Society, the American Society for Testing Materials, and the National Bureau of Standards are co-operating through a Joint Committee in exposure tests of plating on copper, brass, zinc, and die castings. Specimens have been exposed at six locations for about 18 months and inspected at intervals. Informal progress reports have been sent to committee members, inspectors, and other interested persons. Details regarding the composition of the base metals, and the composition and thickness of the coatings are contained in the report of the Joint Committee, published by the A.S.T.M. in June, 1936. A copy will be furnished on request to the undersigned. The methods used in plating are described in the A.E.S. MONTHLY REVIEW for October, 1936. The status of each set after 15 months' exposure is listed in the mimeographed report dated August 1, 1937, a copy of which will be sent on request.

At conferences held by the Joint Committee in Chicago in March, 1937 and in New York in June, 1937, it was decided to prepare and expose, if possible by the spring of 1938, some supplemental specimens, in order to confirm or extend the observations thus far made; and also to have some of these sets plated in commercial plants in order to compare the performance of similar laboratory and plant specimens.

Since then, numerous suggestions have been received regarding the exact scope of these tests, some of which involve questions of policy. So much time is required to prepare the specimens and to complete the exposure tests, that it is especially important to fully consider all such questions in advance. The purpose of the conference in Washington on October 6, 1937 is to discuss these questions and to make recommendations to the Joint Committee that is responsible for deciding the details of this investigation.

This notice is being sent to members of the Joint Committee, to the Research Committee of the A.E.S., interested members of the A.S.T.M. Committees A-5, B-3, and B-6, and to those taking an active part in the inspections. These, and any other interested persons are invited to this conference. Those expecting to attend are requested to notify the undersigned, so that seating and luncheon arrangements may be made. Those unable to attend are requested to send explicit comments on any of the following questions, so that they may be considered at the conference.

Among the questions to be discussed are the following:

1. What additional or repeat tests should be made on brass and on steel?
2. What methods of preparing die-castings should be used on specimens plated at the National Bureau of Standards?
3. What procedures should be used in plating die castings in the plants that have agreed to cooperate in these tests?
4. Under what conditions should proprietary solutions, for example for bright nickel plating, be employed (a) in the plant tests, and (b) in the N.B.S. tests?
5. Should any changes be made in the method of inspection and rating?
6. Should some of the specimens be cleaned, for example after one year's exposure, to determine the condition of the coating and base metal?
7. Should a small proportion of the new specimens be treated with a thin, uniform grease film, as was done during the second year of the current tests?
8. Should exposure tests be continued in Pittsburgh, where all of the specimens become discolored within a few months, or should some other typical but less severe industrial location be included?

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At 9:00 A.M., that is, just prior to the morning session, an informal inspection will be made of the specimens exposed in Washington, in order to better acquaint all those present with the scope and methods thus far used.

Following the afternoon session, meetings of the A.E.S. Research Committee and of the Joint Committee will be held to decide details in the light of the recommendations made by the conference.

Respectfully,

W. BLUM, *Chairman.*

Joint Committee on Exposure Tests of Plated Coatings on Non-Ferrous Metals, A.E.S. and A.S.T.M.

NEWS ITEM

For many years the men in the laboratory of the Bruce Products Corporation have contended that buffing compositions were poorly constructed and wasteful in use; that the very nature of the construction of the present bar was not suited to the adopted method of applying to the buffing wheel and that a great deal of the effort to make adhesive buffing compositions was lost because of the nature of the bar itself. Much research and development work was carried on to improve compositions by the introduction of new materials and the proper balancing of the ingredients, some of which proved beneficial. However, there were certain limitations because of the rather antiquated method of producing buffing compositions which has remained practically unchanged since the earliest days of the Industry. This method prevented the use of certain definitely proven beneficial ingredients in buffing compositions. In other cases where larger percentages of ingredients commonly in use were desired, these could not be employed because, again, of the generally adopted method for producing these products. With the determination to eliminate these shackles, a rather long and tiresome, and at times, discouraging program was followed. After many failures, success crowned their efforts in the complete elimination of the old cycle of "mixing-moulding-cooling-and subsequently removing from moulds" method of producing buffing compositions.

The new method mixes, shreds, vacuumizes or de-airs, cools and forms the bar in one continuous operation with no interval. This method gives an entirely new structure to the bar eliminating former restrictions, improves the type of package, eliminates a large percentage of the waste from sloppage, chipping, breakage and the other difficulties in connection with water cooling. The new buffing compositions contain ingredients that were impossible to use in some cases in desirable amounts in the old Process. The new compositions have uniform and greatly improved density of structure which could not be obtained by the old method where a moulded bar, air or water cooled, was produced. In the elimination of air pockets and the innumerable voids found present in virtually all moulded solids, much improvement was discovered and this was particularly true in the case of certain materials which must be packed and sealed in air-tight containers. The new Process permits an almost unlimited choice in the size and shape of the bar. Savings are realized because of less waste and less labor. Better buffing compositions are produced because new materials can now be used and old materials made more effective by the increased and uniform density of the internal structure of the bar.

These products are being marketed under the names of TRI-VAC, the buffing composition for base metals — LI-VAC, for the plated metals, and LUB-VAC, the new polishing wheel lubricant.

In view of the radical improvements in these new products over the old compositions, the company is taking the necessary steps to obtain full patent protection.

BRUCE PRODUCTS CORPORATION
Detroit, Michigan

E M Baker

The Monthly Review

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NOVEMBER 1937

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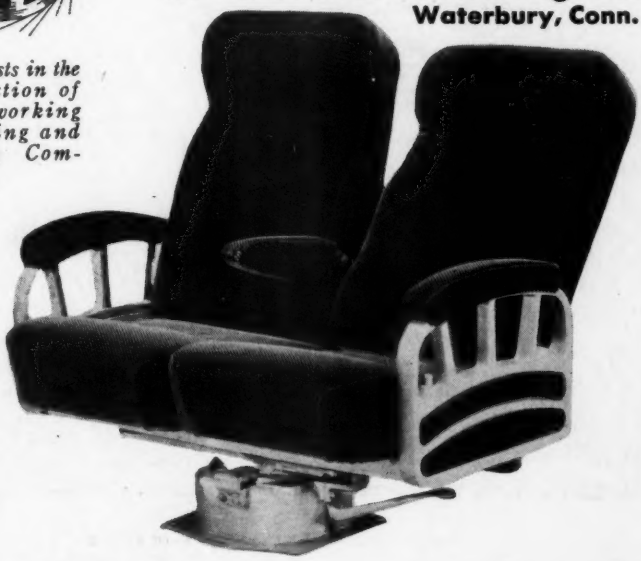

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